NATIONAL ANTARCTIC EXPEDITION

1901-1904

NATURAL HISTORY

VOL. III.

ZOOLOGY AND BOTANY

(INVERTEBRATA: MARINE ALGAE, MUSCI)

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PREFACE.

WHEN, in *1901, the Expedition of the* S.S. 'Discovery,' under Captain Scott, R.N., was sent to the Antarctic Regions, the Trustees of the British Museum gave their assistance to this national enterprise by allowing the cases containing the natural history specimens which might be obtained by the Expedition to be sent to the Natural History Museum for unpacking and sorting. They further undertook to publish a detailed report on the collections so obtained, under the superintendence of the Director of the Natural History Departments.

Some of the most important collections have been dealt with by naturalists who were members of the Expedition. Thus, the Mammals and Birds are described by Dr. Edward A. Wilson, the Isopoda and Pycnogonida by Mr. T. V. Hodgson, and the Rocks (in relation to Field Geology) by Mr. H. T. Ferrar. Other groups have been dealt with by members of the staff of the Natural History Departments of the British Museum: Mr. Boulenger describes the Fishes; Mr. E. A. Smith, the Gastropoda, Lamellibranchia, and Brachiopoda; Mr. Jeffrey Bell, the Echinoderma; Dr. Calman, the Crustacea Decapoda, and the Cumacea; Mr. Kirkpatrick, the non-calcareous Sponges; whilst Mr. G. T. Prior has prepared a petrographical description of the Rock-specimens.

It has been necessary to obtain the assistance of other specialists in order to deal with the rest of the collections. So far as the latter group of contributors is concerned, the following is a list of the subject-matters, together with the name of the naturalist who has undertaken the work in each case:—

EMBRYOS OF SEALS	DR. MARRETT TIMS.
ANATOMY OF EMPEROR PENGUIN	MR. W. P. PYCRAFT.
TUNICATA	PROF. HERDMAN.
CEPHALODISCUS	DR. RIDEWOOD.
CEPHALOPODA	DR. HOYLE.
NUDIBRANCHS AND PTEROPODS	SIR CHARLES ELIOT, K.C.M.G.
POLYZOA	MR. H. W. BURROWS.
EGGS AND YOUNG OF ASTERIAS	PROF. MACBRIDE.
AMPHIPODA	MR. A. O. WALKER.
SCHIZOPODA	MR. HOLT.
NEBALIÆ	DR. J. THIELE.
OSTRACODA	PROF. BRADY.
COPEPODA	DR. WOLFENDEN.

Cirripedia	Prof. Gruvel.
Myzostoma	Prof. v. Graff.
Acari	Dr. Trouessart.
Collembola	Prof. Carpenter.
Polychæta	Prof. Ehlers.
Gephyria	Mr. A. E. Shipley.
Chætognatha	Dr. Fowler.
Nemertines	Prof. Hubrecht.
Free Platyhelminthes	Mr. F. F. Laidlaw.
Cestoda	Mr. A. E. Shipley.
Nematoda	Dr. v. Linstow.
Zoantharia	Mr. Clubb.
Alcyonaria and Pennatulida	Prof. Hickson.
Hydromedusæ	Mr. E. T. Brown.
Calcareous Sponges	Mr. Frewen Jenkin.
Radiolaria	Mr. Lewis H. Gough.
Mosses	M. Jules Cardot.
Lichens	Mr. Darbishire.
Algæ (Marine)	Mrs. Gepp.
Algæ (Fresh-water)	Dr. Fritsch.
Algæ (Calcareous)	Dr. Foslie.
Phytoplankton	Dr. Lewis H. Gough.

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E. Ray Lankester.

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ON COLLECTING IN ANTARCTIC SEAS.

By T. V. Hodgson, F.L.S.

As the stay of the 'Discovery' in Winter Quarters extended over two years, it may be of some interest to explain the principal features and conditions of the locality where such a large proportion of the collections were made.

McMurdo Sound, as it now appears on the charts, is the channel passing between the mainland of South Victoria Land and the large island upon which the active volcanoes Erebus and Terror stand. The Sound is, however, converted into a true bay by the passage across its southern extremity of that vast sheet of ice which forms Ross' Great Ice Barrier, and which as effectively closes it as if by *terra firma*. As this great ice sheet travels northwards past the Sound, pressure is relieved and the ice invades the bay, but its action is checked and complicated by means of certain islands as shown on the map issued with Vols. I. and II. Of these, White Island is the most important, as it lies nearly half-way between Minna Bluff and Cape Mackay, dividing the southern opening of the Sound into two. The larger and more easterly of the two openings is by far the most important, as the other is complicated by the presence of Black Island. Brown Island exerts but little influence on the ice movements of the Sound.

A tide crack separating the Barrier from the "floating" ice runs between Black Island and the Bluff Range a little to the south of Mount Discovery. From the south-west corner of Black Island there is a continuous if gradual rise in the ice-sheet to a line between the south-east corner of the same island and White Island. From this point there is a comparatively rapid descent possibly equal to, if not greater than, the previous ascent; the descent is accomplished in the distance of half a mile, and there is a triple tide crack at the bottom. The mouth of the Sound from Cape Bird to an unnamed headland on the mainland is about forty-two geographical miles wide, and it is approximately the same distance from Cape Bird to Hut Point, under the shelter of which the 'Discovery' lay. These figures were given to me by Lieut. Armitage when we were in Winter Quarters. Subsequent observations, as shown by the map, seem to have modified them a little.

On the 20th of January, 1902, the 'Discovery' passed across the mouth of McMurdo Sound; it was then full of ice. The floes were of no great size and for the

most part rectangular, massed so thickly together that it was not deemed desirable to force the ship through them, so the voyage was continued to the eastward. Returning on February 7, the 'Discovery' found the Sound full of loose ice on the eastern side, but the western side was clear. New Harbour was examined and also the "rough" surface of the old or permanent ice further to the southward. Then, crossing the Sound, the ship arrived at the site of our future Winter Quarters on the 8th of February, anchoring just north of Hut Point in what is now called Arrival Bay. Winter Harbour, to the south of Hut Point, was then full of ice, but the position of the ship not being considered satisfactory, she was taken into it, and for a few days lay alongside the ice face with only just enough room for her length. At that time open water existed for some eight or nine miles to the westward of Hut Point, but only for a few hundred yards to the southward. During the next few days the ice went out in instalments, and on the 17th of February the harbour was quite clear.

Cape Armitage lies a mile to the S.S.E. of Hut Point, and may be said to form the southern boundary of the harbour. After the ice went out, open water extended for a distance of about four miles to the south, and for about a mile and a half to the eastward round Cape Armitage. This, we afterwards learnt, might be taken as the approximate boundary between the fluctuating sea ice and the permanent or barrier ice which had forced its way into the Sound from the southward, as already stated. In proof of this it may be mentioned that on February 12th several diminutive bergs of very irregular shape passed the mouth of the harbour on their way northward; these were obviously fragments from the barrier ice, and in later days, when sledging expeditions were undertaken, it was found that the difference in level between the barrier and sea ice was from two to ten feet, the difference increasing from east to west, but not with any regularity. There cannot be the slightest doubt that the whole of the ice, with the exception of the bergs already alluded to, that went out of the Sound in the early part of 1902, was "one-year ice," a fact proved by the condition of the drifts against the shore, and the complete absence of pressure ridges at Pram Point. We were not frozen in till near the end of March, and during the six weeks that we were waiting for that event some shallow water dredging and trawling took place whenever a boat was available. Winter Harbour was a small bay about half a mile wide across the mouth, and about a quarter of a mile deep. It lay at the extremity of a spur from Mount Erebus termed the Ridgway, but this name is not an official one. This spur was some ten miles long, and from one to three miles across; at Winter Harbour it was about a couple of miles wide. Within a radius of three miles round Hut Point lay the scene of our more active operations, the whole of the western side of the Sound being closed by reason of the ice conditions, the distance from Winter Quarters, or both combined. The following report therefore refers more particularly to the eastern side, which became fairly accurately known. One prominent feature of the Sound was the so-called "Glacier Snout," an undulating tongue of ice connected with the Ridgway

quite close to its junction with Mount Erebus and extending seawards for some ten miles, but nowhere more than a mile across. Its extremity was about nine miles from Hut Point. North of this lay four small islands. These have since been named the Dellbridge Islands. The more westerly one of these was about a mile from the Glacier Snout, and called "Tent Island," as close by it a camp was established when the attempt was made to assist nature by sawing a channel for the ship through the ice. The camp was maintained for some time after the sawing-out operations had been abandoned, and for a short time some dredging operations were conducted among the numerous ice cracks round the island. A bare mile to the north was Inaccessible Island, so called on account of the difficulty of exploring it by a single individual, not on account of its real inaccessibility. These two islands were about the same size, and perhaps a quarter of a mile long, between 300 and 400 feet high. A couple of miles further on, on the lowest slopes of Mount Erebus, was Skuary Point, a broad expanse of basaltic rubble and patches of snow where the Skua, *Megalestris maccormicki,* bred in large numbers. It was from this place that most of their eggs were taken for scientific and domestic purposes.

The shore line is not much indented, except here and there, where precipitous cliffs are exposed. It is covered by a vertical wall of ice varying from between two and a hundred feet in height, consequently there is no tidal zone. Access to the shore from the sea or *vice versâ* is in many places rendered easy by the "drift" slopes which speedily accumulate in winter. In the neighbourhood of Cape Royds the shore is not so precipitous, and a small tidal zone exists, consisting of boulders and volcanic sand. This area was not explored till the relief ships arrived in 1904, and then it was not possible to do much. Red Algæ were however seen to be abundant.

The state of the ice in the Sound is almost entirely dependent on the weather, and that is an efficient explanation of our failure to escape from Winter Quarters during the summer of 1902–3. A three days' blizzard at the beginning of May, 1902, when the ice was about two feet thick, swept every particle of it out of the Sound, again exposing the area that was open when we arrived in February. In the following September a gale again swept out the ice, and we had open water to well within eight miles of Hut Point. Events of this kind are however accidental. Large areas of the Ross Sea are known to be ice-free at irregular intervals, very early in the season, after the return of the sun on August 23rd. Whatever the condition of the fixed ice in the Sound, all through the summer the mouth is choked at irregular intervals with fields of loose ice, brought in by wind and weather from unknown localities, most probably from the eastward, the current setting from that quarter. Part at least of these fields are eddied into the Sound as they are directed northward by the trend of the coast. It is the frequent presence of these masses of loose ice that damps down the swell that may occur in the Ross Sea, and so retards the breaking-up of the fixed ice. During the season of 1902–3 the open

water never came within five miles of the 'Discovery,' so that in the following season its gradual approach was watched with more than ordinary interest, not to say anxiety. On January 4th, 1904, when the relief ships arrived there were at least eighteen miles of ice still to go; some fourteen miles went out in about six weeks, but on February 14th the necessary conditions obtained, and four miles of fast ice broke up and started northwards in about as many hours. At the time it was practically a dead calm, so that the wind had no influence. When we passed Winter Harbour for the last time, on February 18th, the last masses of ice were floating out, a phenomenon which had occurred one day earlier two years previously.

The foregoing is the briefest possible account of the ice conditions prevailing in McMurdo Sound, and is not without biological interest, as by it the Sound may be divided into three areas.

The first, or Northern area, extends from Cape Bird to the so-called "glacier tongue," and includes the Dellbridge Islands. This is on the eastern side of the Sound. A line drawn from the "Glacier Snout" to the southern boundary of New Harbour forms the southern limit of this area. Open water occurs in this area for at least four months of the year as a general rule; in the more northern part of the area, beyond Cape Royds, the period of open water is probably much longer. This is incontestably proved by the Penguin rookery at Cape Royds and the large breeding place for the Skua at Skuary Point, neither of these species going far from water except in occasional wanderings. The Penguin requires open water and a convenient landing place, both of which were obtainable at Cape Royds; the Skua is less dependent on either, but seeks for the former. Our presence brought immense numbers to Hut Point, but only a few stragglers bred there; they bred in very large numbers on the numerous islets on both sides the Sound, where the open water was within easy reach.

The second, or Central area, includes the rest of the Sound south of the Glacier Tongue and New Harbour, which is periodically open to navigation, rarely exceeding a couple of months at this point, a good deal less than that south of Cape Armitage. A small area of open water occurred under Hut Point during the summer, caused mainly by the ice-movements in the vicinity. A large lake also appeared off Cape Armitage, over a shoal, and was fully half a square mile in area. The explanation of this phenomenon ultimately arrived at was that the shoal brought the deeper and warmer waters of the Sound to the surface as the current swept past the Cape, and so melted the ice through. This occurred in January 1902 and 1903, and a little later in 1904. It had just frozen over when we arrived in 1902.

The third, or Southern area, is much the largest, and includes the whole of that part occupied by the permanent or barrier ice. As the ice is covered as soon as it is formed by a thick deposit of salt crystals and very shortly afterwards by snow, it forms an opaque covering over the sea bottom through which no light can penetrate,

hence vegetable life to which light is essential is reduced to the minute forms pertaining to the Plankton.

A large Laminarian was dragged up by the anchor in Arrival Bay and was unfortunately thrown away; this was the only seaweed found within ten miles of the ship. A quantity of red Algæ was found off the shore of Tent Island, and more again at Cape Royds. Repeated dredgings inside the 20-fathom line in Winter Harbour produced nothing whatever in the way of seaweeds, and dragging in Arrival Bay for *Laminaria*, carried out because it had once been found there, was equally unsuccessful.

As soon as the Sound was frozen over the biological work was carried on through holes in the ice. It was soon found that these holes had to be made large, and at the beginning they were about six feet square. The ice taken from them had to go somewhere, and as any irregularity of surface caused drift to accumulate, the blocks were placed to windward and built up as a wall. In a comparatively short time this developed into a circular shelter some fifteen feet in diameter and six to ten feet high, having a small entrance to leeward.

As one could work in perfect comfort in these shelters all through the winter, the work was scarcely interrupted. One had, however, to buy wisdom with experience. At first the drift was allowed to accumulate outside against the wall, an error which caused an immense amount of trouble, drift getting in over the top to the serious hindrance of the work. It is absolutely imperative that the outside of such shelters shall be kept vertical, then the bulk of the drift is kept out, as it invariably beats back from a vertical face. As continuance of the work throughout the winter was not expected, the routes to these shelters were not marked out, and frequently they were very difficult to find in the dark; this occasioned a further considerable loss of time.

After the blizzard at the beginning of May, 1902, when the ice was blown out of the Sound and open water came to within 100 yards of the ship, advantage was taken of the circumstance to sink 100 fathoms of line over the edge of the remaining ice, the two ends being secured to the ice 100 yards apart. When the Sound was again frozen over, a suitable hole was cut at each end of this line, then a light trawl (commonly called the D net on account of the shape of its frame), and an additional line was attached, so that the net could be hauled backwards and forwards underneath the ice. This proved an exceedingly profitable investment till one of the ropes broke, then operations were suspended. At intervals, however, cracks occurred in the ice across the mouth of the Harbour, and through some of these the bight of a line was forced for 100 yards; this came to be regarded as the practical working distance. New holes were cut and fresh lines rove, the rest of the work proceeding as before. This operation was not conducted without difficulty or delay from various causes.

Another serious impediment to the work of the first winter was the formation of ice crystals on the nets and lines. At the end of May, 1902, two tow-nets were

lowered to a depth of 6 and 7 fathoms respectively on the same line at No. 3 hole, half a mile from the ship, the total depth of the water being 56 fathoms. Owing to bad weather and the accumulation of drift, these nets could not be recovered for eighteen days. It was then found that the line was thickly covered with thin plate-like crystals of ice, of roughly hexagonal shape, and from one to four square inches in size. The upper net of fine mesh, 150 to the inch, was similarly covered both inside and out; the lower net of coarse mesh, 50 to the inch, was equally thickly coated, but with crystals of much smaller size, comparatively minute. Naturally the contents of the nets were ruined, their prolonged stay under water would have been sufficient for that, independently of ice crystals. The occurrence of these crystals was at first thought to be due to the prolonged immersion of the nets. However, they occurred constantly from this date, even in twenty-four hours' immersion, but not so badly on the nets. It was not suspected for some time that depth had anything to do with it, and most of this time I was working alone, and so could not see how far these crystals extended on the lines of the traps. However, on one occasion, Sept. 19, 1902, a trap set in 100 fathoms had been down for three days, and the crystals were measured on the line to a depth of 17 fathoms. The line used was a quarter of an inch in diameter; with the crystals on it, it was increased to something like a foot. Ultimately it was found that under ordinary circumstances, *i.e.*, when nets, etc., could be visited every forty-eight hours at the outside, immersion to a depth of 10 fathoms kept the nets free, the crystals only descending to a depth of 5–8 fathoms. This phenomenon occurred from June to October, when the temperature of the water was 28·4° F. or – 2° C. By October the temperature of the water had risen to 28·8° F. and the formation of these crystals diminished, the crystals themselves becoming smaller and more scattered, till at the end of the month they finally ceased to exist. During this month similar crystals formed on the sides of the holes; they were easily detached, and had to be removed before the nets could be drawn through, in order to prevent their dropping into the net and so spoiling the contents. They disappeared about a fortnight later. By the middle of November the surface temperature of the water went up to 29° F. At the end of December it was 30° F., by the beginning of February it had gone down to 29·5° F, and to 28·8° F. before the end of the month. The annual range of the sea temperature was, therefore, less than a couple of degrees. Various thermometers were used in these observations, and as some of them were lost it is not possible to apply any correction for error.

The tides were irregular, but the ebb and flood occurred once in the twenty-four hours. After two or three experiments in tide gauges one was finally rigged up on board the ship. It consisted of a sounding wire attached to a heavy weight lowered to the sea bottom, the depth being 9 fathoms. To pass through the ice the wire travelled through a glass tube of narrow diameter, which was filled with paraffin and kept full. The wire then passed over a pulley on board the ship, with another weight at its inner end, and a pointer being attached the rise and fall was indicated on a scale. As the

tidal observations are not, for the time being, accessible, I can only say, therefore, that the average rise and fall was about three feet; the difference between neaps and springs was about a foot.

The set of the current through the Sound would naturally be influenced by the tide, but, extraordinary as this may seem, it was not noticed. A current-meter placed two or three hundred yards to the southward of the ship, while working, invariably showed a current travelling to the south-east, or around Cape Armitage. Two holes were constantly kept open in order to obtain specimens, one of these was close to the ship, the other about a mile and a half distant; others there were, but they were of a more temporary nature. Up to the end of January, 1903, the current invariably carried the lines, that depended from these holes, to the south or south-east according to the position of the particular hole, that is, round Cape Armitage towards the outlet of the Sound between White Island and Cape Mackay. Quite suddenly on Feb. 2, 1903, the current was noticed setting very strongly to the northward, or exactly opposite to the normal direction. This lasted for a few weeks, but it was not constant. It then reverted to the normal and became constant in general direction, but not in strength. I was unfortunately confined to my bunk during the "critical" period of 1904 and was, therefore, unable to note the change of current. If such occurred at that period, no mention was made of it by others; just before then it had varied considerably in strength but not in direction.

As regards the sea bottom, its composition, as far as could be ascertained, was an exact counterpart of the land surface. The heights round Winter Harbour were composed almost exclusively of basaltic rocks, the average elevation of which was over 400 feet, though Crater Hill in the background was 1000 feet high. This extremity of the Ridgway consisted of extinct craters in a more or less shattered condition, the greater part of the rock lying in small angular lumps, with here and there a sprinkling of boulders of very moderate dimensions, and on the lower levels, patches of a fine gravel or coarse sand. The bottom of the Sound was the same wherever it could be examined: angular basaltic stones everywhere, with small patches of volcanic sand, mud and boulders of varying size near the shore. The shoal off Cape Armitage, already alluded to, was more covered with organic débris, chiefly polyzoa and shells; especially on its south-eastern slopes, which were rather steep. No. 10 Hole was over this slope, a mile and a half S.S.E. from the ship in 125 fathoms.

In the north, 10 miles from Hut Point, the Dellbridge Islands rise apparently abruptly from the bottom. The so-called "Glacier Snout" lay a mile nearer the ship, and presented many peculiar features which could not be fully investigated. It is not directly connected with Mount Erebus, and many circumstances point to its being on a submerged ridge, but two soundings taken at the end of our stay only serve to complicate the problem. They were taken against the Glacier Snout, half a mile from its free end; that on the south side showed bottom at 175 fathoms, that on the north

side 150 fathoms. It is impossible to understand how such a mass of ice, if floating, can hold together at such an angle to the general current.

Speaking broadly, it may be said that the Sound forms a deep trench with a fairly even bottom, the greatest depth sounded being close to the permanent or barrier ice some four miles from Cape Armitage; at that point, 410 fathoms, no bottom was found.

The hundred-fathom line lay about a mile from the ship and about half that distance from Cape Armitage. My two principal holes were a mile and a half from Hut Point, in 125 fms., one to the N.W., the other S.E. Two others, quite two miles due west of Hut Point and not far from each other, were in 163 and 178 fms. respectively. Another hole a mile south of the Glacier Snout and eight miles from Hut Point was in 180 fms. Numerous other soundings were taken by Lieut. Barne within a radius of a few miles of Hut Point, but I have not yet seen the details.

The ice reaches an average thickness of eight and a half feet in the course of a season, and for operating under such conditions tools of a certain kind are indispensable. After consultation with the engineer, Mr. Skelton, it was decided that all tools should be made of mild steel, case-hardened. The effects of temperature were not always borne in mind, and the muscular A.B. was invariably tempted to use his tools as in temperate climates; a very slight leverage caused them to snap, so that notwithstanding the skill of the engineering department, there was very soon a shortage of effective instruments. Not being endowed with the average amount of muscular strength, I did not lose my tools in this way. The tools provided consisted of a pick, pointed at both ends, a shovel and a crowbar termed a "pricker." This was of iron, six feet long and about an inch in diameter, with a chisel edge about two inches broad. These tools are essential; with regard to the pricker, its use for any length of time makes the hands very cold, irrespective of the amount of covering one may wear. The weight of the tool is an important factor, and it should be maintained, though the length of the iron could be reduced to about three feet, and a wooden stock of the same length added. As its only use is as a stabber, the wooden stock would not be a disadvantage. As the ice thickens, and as long as the hole is kept in trim it is only necessary to remove a slab of ice one or two feet thick every day, but as the water is at freezing point for fully six months of the year, the holes freeze up and close in at the sides and bottom; they therefore have to be shaved in order to maintain their size. A tool was made for this purpose, but the resources of the ship were not equal to making it heavy enough. It should be a sharp chisel about 3 inches wide, and near 10 lbs. in weight, attached to a wooden handle 9 feet long. Another essential tool, but one readily improvised, is a stout hook at the end of a 12-foot pole. The lines were always carefully placed in the centre of the hole, but were invariably more or less displaced, partly by the current, but more generally by the seals. After the ice had become 4 feet thick the lines were frequently caught up at the lower edge of the hole and frozen in. This was a frequent

source of loss; but if the ice could be hooked up from below before any attempt was made to release it, the loss could be avoided. It should be borne in mind that a large proportion of the work was done in the dark and, apart from this fact, once water gained access to the hole, the whereabouts of the line was more or less a matter of guesswork. Lines cannot be coiled nor wound on a winch; when frozen they snap only too readily. It was always necessary to "walk away" with them when hauled, and let them lie out straight on the floe. If, however, the depth was greater than 30 fathoms, or thereabouts, they lay out in festoons. Lengths of flexible steel rope not exceeding an eighth of an inch in diameter are strongly recommended, as these can be wound on a small light winch, but it is necessary to be on the sharp look-out for kinks, which are of far greater importance than in temperate climates. The use of steel rope involves the use of snatch-blocks and tripods. A single winch secured to a sledge is sufficient for any number of holes, also a single snatch-block. The tripod should be frozen in over each hole, the rest is a mere matter of management. Another very important tool of which we were quite deficient is an ice saw, some 3 or 4 feet long, with a wooden handle, to be worked by one man. For keeping the holes open and for negotiating cracks these would be invaluable. Our smallest ice saw was 13 feet long, and useless for biological purposes without a number of men.

The lines were very frequently "stranded," though never cut through, presumably by the seals coming in contact with them and snapping at them as they passed; there did not appear to be any other reason for this. The lines had then to be cut through and knotted. Although the line was always hauled over a bar, usually the pricker, it was—especially in the deeper water—deflected by the current and, cutting into the ice, hitched up at every one of the knots, which before long were numerous. This rendered hauling the traps single-handed rather a difficult matter, but the lines stood the strain well; it was only when completely frozen that they snapped. The traps used were at first wooden frames two feet square at the base, covered with mosquito netting, after the fashion of a lobster-pot. As the ice increased in thickness these rigid traps became difficult to negotiate through the holes, and moreover supplies were not inexhaustible. The ordinary tow-net, tied up at one end and baited, was much more convenient and quite as effective. Swabs attached to the traps were always used and very satisfactory.

Dredging in some form was always carried on inside the 25-fathom line, but beyond this depth stationary traps only could be used. However, in deep water (125 fathoms) the trap or D-net was frequently sent down light and very slowly, so as to be carried by the current as much as possible from the vertical. Then one or two 25-lb. sinkers were sent down and the net hauled. Sometimes this was very successful, sometimes it was not. The captures were brought to the ship either in glass bottles or in a large tin-lined packing-case previously made water-tight. In the winter of course everything froze at once and had to be thawed out on board ship. In the summer the specimens were hardly so well off, for, although they did not freeze,

the water was generally full of ice crystals which, with the jolting of the sledge as it travelled shipwards, cut the more delicate specimens to pieces.

If the flora of McMurdo Sound was poor, the fauna was extremely rich, as the collections described in this and other volumes show. It is to be regretted that the difficulties of the investigation precluded the capture of specimens from greater depths and distances from the ship, so that a more complete comparison of the fauna at different zones could be made.

APPENDIX.

Two other matters require attention by those who visit the distant south. One concerns the trawls and nets generally. On the outward voyage of the 'Discovery' it was found extremely difficult, if not impossible, to keep the nets dry owing to constant leakage into the deck-houses. As this bade fair to continue throughout the voyage, as it actually did, all the nets were tarred in New Zealand as an attempt to preserve them ; it was successful in this respect, but it depreciated their value for work in cold temperatures. They became so hard as to be difficult to manipulate, and also inflicted far more injury on the specimens than they would have done if treated in another way. A thorough soaking in oil is suggested.

The other matter concerns the work at sea ; as a matter of fact very little was done. An accumulator of some form is almost a necessity, certainly if any extensive work is contemplated. The one provided was the old pattern of india-rubber bands as supplied to H.M.S. 'Challenger.' The instrument was quite useless. The cold weather rendered the rubber bands hard and brittle ; apart from that, the days of the hemp rope are over, and the great weight of steel ropes renders the use of such an accumulator a very cumbrous affair. The only kind that can be used in a Polar climate is one made of steel springs, such as that used by H.S.H. the Prince of Monaco, or by the Norwegian Government on board the 'Michael Sars.'

MOLLUSCA.

VI.—PTEROPODA.

By Sir C. Eliot, K.C.M.G., LL.D.

(2 Plates.)

The Pteropods collected by the 'Discovery' comprise the following species: —

Name.	Quantity.	Locality.
1. *Limacina antarctica*, Woodward .	Numerous	Winter Quarters, and the region about Lat. 61°, Long. 140° E.
2. *Limacina retroversa* * (Fleming) .	Moderately abundant	From Long. 95° 43′ W. to Long. 173° 33′ E., and from Lat. 55° to Lat. 61° S. None from Winter Quarters.
3. *Clio sulcata* (Pfeffer) . . .	Two specimens and some fragments	Lat. 63° 04′ S., Long. 175° 43′ S.
4. *Clione antarctica*, E. A. Smith .	Numerous	Winter Quarters.
5. *Spongiobranchaea australis*, D'Orb..	Five specimens	Winter Quarters, and Lat. 55° 31′ S., Long. 156° 19′ E.

Winter Quarters were in Lat. 77° 49′ S., Long. 167° 7′ 4″ E.

* Some naturalists might regard the forms here called *Limacina retroversa* as at least two distinct species.

Though *L. antarctica* and *Cl. antarctica* are represented by numerous specimens, and clearly are enormously more abundant than the other species, the quantities contained in each tube suggest that they do not occur in such great shoals as the northern forms.

I received the specimens in two consignments, described respectively as Pteropods and Pteropods from the Plankton. The former, it would seem, were taken out of holes cut in the ice; the latter in the open sea. In most of the tubes the Pteropods are mixed up with other forms, such as small crustaceans, larvæ of Lamellariidæ, and a globular gelatinous mollusc (probably *Lamellaria mollis*, E. A. Smith). In the majority of specimens the soft parts are well preserved, but the fragile shells are not only broken, but partly dissolved by the fluid in which the animal has been killed or kept. The number of perfect shells in the collection is small.

In the above table I have entered *Limacina antarctica* and *Clione antarctica* as

distinct species, and not as varieties of *L. helicina* and of *Clione limacina*; but I have entered as *L. retroversa* specimens which others might be disposed to call *L. australis* or *L. lesueuri.* I have given below my reasons for these identifications and distinctions, but I recognise the possibility of interpreting the facts differently and also the uncertainty of some of the facts. An examination of several collections shows that both the shells and soft parts of Pteropods are very susceptible to the influence of the fluid in which they are preserved, so that individuals belonging to the same species may become superficially dissimilar in shape and colour. To this must be added the differences arising from age and local variation. But, making the widest allowance for such influences, I am still of opinion that the two chief Antarctic forms (*L. antarctica* and *Cl. antarctica*) are distinct from the corresponding northern species.

The distinction is most clearly marked in the genus *Clione.* Comparing the Antarctic specimens with typical specimens of *Cl. limacina*, one may even say that they are a well-marked species, unless indeed they are immature, as might be argued from their small size and other features. The differences between *Limacina helicina* and *L. antarctica* are less noticeable, and some may think that the term variety is sufficient to cover them. But they are internal as well as external, and it seems to me safer to regard the forms as specifically distinct, at least provisionally. On the other hand, all the Limacinas with elevated spires collected by the 'Discovery,' though showing considerable variation, form in my opinion only one specific type, and if this is admitted, I do not see how that type can be distinguished from *L. retroversa.* The only differences lie in the colour and striation of the shell. Even if natural, they are hardly of specific value, and they are very likely due in part to the action of the fluid in which the animals were kept. The alternative of recognising about four separate species is possible, but not only do the forms pass into one another by intermediate stages, but they appear to live together. It is noticeable that *L. retroversa* was not found as far south as *L. antarctica* and *Cl. antarctica*, and does not extend much beyond Lat. 60° S. This agrees with the distribution recorded by other expeditions.

Whether we call the Antarctic forms varieties or species is, in reality, a comparatively unimportant question. That there are some differences of detail between them and the Arctic forms everyone will admit; that the two sets of forms are nearly related is equally clear. The interesting point is that in both the Arctic and Antarctic seas the predominant, and as we approach the Poles probably the only Pteropods are closely allied, or even identical species of *Limacina* and *Clione.* The characters which these Arctic and Antarctic forms present are compatible with any hypothesis which assumes that they are derived one from the other, or from a common ancestor. Further, the distribution of these forms is interrupted by a wide zone in which they do not occur. None of them are recorded from within thirty degrees either north or south of the Equator.

I confess that I have seen no explanation of these facts which appears to me satisfactory. Our knowledge of the direction in past ages of ocean currents which must have largely determined the distribution of pelagic forms is slight, and our record of fossil Pteropods is very imperfect. As far as I can ascertain, none are recorded from South America or South Africa, but it hardly seems possible to argue profitably about the distribution of the group in the past without definite information on this point.

Meanwhile it is interesting to observe that one Antarctic form, *Clio sulcata*, is closely allied to a cosmopolitan form, *Cl. pyramidata*, and may plausibly be considered as a special adaptation of it to Antarctic life. Also, if *Limacina lesueuri* is admitted to be merely a variety of *L. retroversa*, then *L. retroversa* is cosmopolitan and bipolar. Is it not probable then that *Clione antarctica* and *Clione limacina*, plus some tropical forms of the genus, represent variations of a once cosmopolitan species? There is nothing unnatural in the idea that such a species may have undergone similar but not identical changes in North and South Polar waters. The species of *Clione* inhabiting the warmer seas (*Cl. longicaudata*, *Cl. flavescens*, and *Cl. punctata*) have not been described in great detail, but they do not seem to differ from the Arctic and Antarctic species so profoundly as to forbid the supposition that all may be modifications of one form. It is noticeable that the Arctic and Antarctic species have invariably three pairs of buccal cones, whereas the warm water species have two pairs or only one. The forms of *Limacina* which predominate in the tropics are not nearly allied to *L. antarctica* and *L. helicina*, but Dr. Meisenheimer states that *L. rangi* "weist ausserordentlich nahe Beziehungen zu *L. helicina* auf," * although he separates the two. This species, as to whose independence authors are not agreed, has been found as far north as Lat. 33 S. *L. helicoides*, which is known only by the shell, resembles *L. helicina* and *L. antarctica* in having a flat spire, though it is specifically distinguishable. It is widely, though sparsely, distributed in the warmer waters of the Atlantic.

The anatomy of the Pteropods has been so fully described by various authors that in the following notes I have not touched on it, except when necessary for purposes of classification. My best thanks are due to Mr. T. J. Evans, Lecturer on Zoology in the University of Sheffield, for preparing sections and drawings, and for much assistance.

LIMACINA.

Ten or eleven species have been referred to this genus, but the animals of *L. triacantha* and *L. helicoides* are unknown, and opinions differ as to whether all the other species are really valid. The relationships of *L. helicina* and *L. antarctica*, as well as of *L. retroversa*, *L. lesueuri* and *L. australis* are discussed below.

There is some difference of statement as to the presence or absence in this genus of organs called jaws, and possibly some variation in the texture of the

* Südpolar Expedition. Pteropoden, p. 105, 1906.

organs themselves. Sars, who is quoted by some subsequent authorities, gives (Mollusca Regionis Arcticæ Norwegiæ, 1878, p. 328) *maxillae nullae* as a character of *Fam. Limacinidae*, but on Plate XVI., 17, b, he figures a collection of lamellae with denticulate or fringed edges, and explains them (p. 462) as *maxilla una* 190*ies* *aucta.* But in fig. 21, b, of the same Plate, representing the buccal parts of *Clione limacina,* what appears to be one of the hook sacks is described as *maxilla una* 15*ies* *aucta.* It is clear therefore that he did not restrict the meaning of the term maxilla to the ordinary molluscan jaw.

Neither in *Limacina antarctica* nor in *L. retroversa* have I been able to isolate any hard jaws, such as are frequently found in *Opisthobranchiata,* but sections show that the sides of the cavity bear folds which are covered with a very thin chitinous layer.

LIMACINA ANTARCTICA, Woodward.

See *Pelseneer*, 'Challenger' Reports, Vol. XXIII. (1888), Thecosmata, p. 22; *id.*, Voyage du S. Y. Belgica, Mollusques (1903), p. 29; *Meisenheimer*, 'Valdivia,' Pteropoden (1905), pp. 7, 8; *id.*, Die Arktischen Pteropoden (1906), pp. 409–413; *id.*, Südpolar Expedition, Pteropoden (1906), pp. 96–98.*

The numerous specimens obtained by the Expedition differ considerably in size, colour, and general appearance, and may be classified under three heads:—

(A.) Black and yellow specimens. The majority are about 3 mm. wide and 2 mm. or a little less in height, but four are as much as 5·5 mm. broad and rather more than half as much in height. An operculum was often found. The fins, hermaphrodite gland, and the majority of the organs are of a pale lemon yellow, varying considerably in intensity, but contrasting markedly with the black mass composed of the digestive organs, and especially of the liver. The shell is extremely fragile and in bad condition, being not only considerably broken in nearly all specimens, but also pierced by numerous holes. The word picric is written on some of the labels, and probably all these specimens were killed with picric acid. This has caused the fins and head parts to remain well expanded, but the action of the acid has coloured the light portions yellow and partially destroyed the shells.

Specimens of this class are recorded from:—

(1) Lat. 61° 46′ S. Long. 140° 12′ E.	Numerous.
(2) Lat. 61° 40′ S. Long. 141° 32′ E.	Fairly numerous.
(3) McMurdo Bay	„ „
(4) Lat. 66° 52′ S. Long. 178° 15′ E.	A few.
(5) W. Q.	„
(6) Wood's Bay	„

* Full titles and references will be found at the end of the Memoir.

(B.) Whitish specimens. In these the prevalent coloration is white or grey, the black visceral mass being seen more or less distinctly, according to the transparency of the shell. The animals are not much expanded, the fins being usually retracted, but the shells are better preserved than in the black and yellow specimens, being thicker, more opaque, less broken and less perforated. The breadth is about 3 mm. and the height about 1·75. These specimens were probably put straight into alcohol, which accounts for the contracted state of the soft parts and good preservation of the shell. They are recorded from:—

(1) W. Q.	Fairly numerous.
(2) McMurdo Bay	A few.

(C.) These specimens, which are extremely numerous, are distinguished by (a) their small size, the diameter being usually about 1·50 mm., and few whorls; and (b) the position of the fins, which form a sort of hood extending beyond the anterior part of the body. As this hood often bears fragments of shell, the whole animal sometimes bears a resemblance to *Limacina inflata,* as figured by Souleyet. But a comparison with specimens of that form, kindly lent me by Mr. E. A. Smith, I.S.O., shows that the resemblance is merely superficial, and that there is no true rostrum above the hood. The coloration is varying: pure yellow, black and yellow, white, grey, and dark grey being all found. Some of the animals have been treated with picric acid, and some apparently put straight into alcohol or formol. The majority of the shells are poorly preserved, though in so large a mass of material good specimens were not wanting. An operculum is generally present; otherwise this form resembles those described above as A and B, and may be regarded as a younger stage.

The Expedition brought back twenty-three tubes containing specimens of this type, all captured at Winter Quarters, none being recorded from elsewhere.

Taking all the specimens together, I have little doubt that they represent a single species which may be thus described.

The shell is between 5 and 6 mm. broad in large individuals, but considerably smaller in the majority, and the height is about half the breadth or rather less. In the best specimens it is white, imperfectly transparent, and faintly but distinctly striated, but the action of the preserving fluid often renders it extremely fragile and the striation may disappear. There are 3–6 whorls (5–6 in large specimens) divided by distinct sutures. The last whorl is considerably dilated and terminates in a large rounded lip, which is generally broken. The spire is somewhat flattened. The umbilicus is moderately wide and deep, but is not surrounded by any raised keel or special border.

In large specimens the fins (fig. 1b) are about 4 mm. long and 3 mm. broad across the tips. They are shaped much as in *L. helicina* and bear a small accessory lobe. The right tentacle is well developed, the left rudimentary. The foot is ample

and the posterior lobe is rather deeply divided. An operculum is often present in specimens of both small and moderate size, certainly in several which have a diameter of at least 3 mm., but is absent in the largest and is probably caducous in adult life. It is much as figured by Pelseneer ('Belgica,' figs. 70, 71) and has a short sinistral spire of two whorls (fig. 2). The balancer or long narrow lobe on the right side of the mantle is well developed.

The jaws mentioned by some writers could not be found by ordinary dissection, but in transverse sections there were seen in the part of the buccal tube lying in front of the radula, dark pigmented folds covered by a very thin layer of a lighter colour and apparently chitinous. In the floor of the cavity are two ciliated grooves (fig. 3).

In individuals having a diameter of 3 mm. or more the radula consists of 8–11 rows containing three teeth each. The teeth (fig. 4) present slight but distinct and persistent differences from those of *L. helicina* (fig. 5) and are larger in proportion to the size of the animal. In the median teeth (4a) the hair-like denticulation is longer and extends higher up the sides of the median cusp, which consequently appears to be shorter; the base is straighter and bears at either end two or more lobes and bulges. The laterals (4b) are less curved than in *L. helicina* and the denticulation, as in the median cusp, extends higher. In the oldest row of teeth the laterals are very thin (4c) and the base of the median tooth is simpler, without bulges.

The whole interior of the stomach (fig. 6) is lined with a thin layer of chitin which gives rise to five stomach plates and also to various prominences and spines (6a) which are larger in the cardiac portion, but do not form four definite accessory plates, such as some authors have reported in *L. helicina.* The four large stomach plates (fig. 6a) consist of a rectangular or oval base out of which rise one or more prominences with strongly jagged edges. These plates appear to play on one another, which probably modifies the details of the shape in each case: in two the point of the projection is more acute and more bent than in the others. When the four projections are in contact a conical hollow remains between them posteriorly and into this fit the prominences of the fifth plate (fig. 6a, e), which is smaller than the others and lies below them on the pyloric wall of the stomach, but is of essentially the same form, though generally seen sideways and hence apparently more triangular. In all the specimens examined the stomach was found to contain globigerina and diatoms.

The inner whorls of the shell are entirely filled with the white hermaphrodite gland.

Authorities are not agreed whether this form is a separate species (Pelseneer) or a variety of *L. helicina* (Meisenheimer). In the hope of contributing to a decision, I have compared with the 'Discovery' collection a large number of specimens kindly furnished me by Professor D'Arcy Thompson, C.B. (from Davis

Straits and North Pacific), the British Museum and others. The following table will show the points of difference which I have found to be constant:—

Limacina antarctica.	Limacina helicina.
1. Maximum breadth observed 5·5 mill.; fins about 4 mill. long.	1. Considerably larger. Maximum breadth observed 9 mill.; fins 10 mill. long.
2. Shell with very fine transverse striation or with none at all. (But see what is said above as to the injuries sustained by the shells.)	2. Striation much stronger and more distinct: sometimes darker than rest of shell.
3. Umbilicus without any sort of keel or distinct border, even in the largest specimens.	3. Umbilicus surrounded by a very distinct circular raised border, which is invariably present in well-preserved specimens of moderate size.
4. The colour of the animal is light, with the exception of a distinct dark mass composed of the viscera and situated chiefly in the second half of the first whorl. The inner and upper whorls are entirely light (fig. 1b).	4. The upper and inner whorls are marked with a dark stripe following the direction of the spiral, so that the shell when seen from above presents an alternation of dark and light spiral stripes. The dark stripe is not hepatic, but is formed by a pigmented membrane which appears to be continuous with the mantle (fig. 1A).
5. The posterior lobe of the foot is more deeply and distinctly divided than in *L. helicina*.	5.
6. The hair-like denticulation of the teeth extends to a considerable height, so that the main cusp is less conspicuous. The base of the central tooth is fairly straight, with knobs at the end.	6. The denticulation is less developed and the cusp consequently seems more prominent. The base of the central tooth is hollowed out almost into a horseshoe shape.

Other points, such as the shape of the operculum mentioned by Prof. Pelseneer, seem to me less certain. Whether the differences tabulated above are sufficient specific characteristics must depend on each naturalist's view of what constitutes a species, there being no accepted definition of specific difference. But as far as the collections which I have examined are concerned, these differences are persistent and concomitant, and it seems to me that when so decided a character as the presence or absence of the raised border round the umbilicus is accompanied by differences in size, colour and the teeth of the radula, the two forms are entitled to specific rank, though the divergences by no means show that they have originated independently, but rather support the idea that they are differentiations of a common ancestor or one of the other.

Limacina retroversa, Fleming.

See especially Meisenheimer on *Limacina retroversa*, Südpolar Expedition (1906), IX. Band, Zool. I. Band, Heft II., pp. 103–105; Eydoux and Souleyet on *Spirialis australis*, Revue Zool. (1840), p. 237, and Bonite (1852), p. 222; *Pelseneer*, 'Challenger' Report, LXV., pp. 25–27; *Munthe*, Pteropoder, pp. 8, 9 (1887).

There are six tubes containing specimens of a whitish *Limacina* of small or moderate size, with a spire of somewhat varying height, but never so low as that of *L. helicina* or *L. antarctica*. The labels are:—

1. Lat. 55° 44′ S. Long. 95° 43′ 30″ W. 5 fathoms (11 spec.).
2. Lat. 56° 12′ 45″ S. Long. 136° 18′ 30″ W. 10 fathoms (3 spec.).
3. Lat. 57° 25′ S. Long. 151° $\frac{3}{4}$′ E. (Several spec.)
4. Lat. 59° 19′ S. Long. 120° 24′ 30″ W. 5 ms. (6 spec.).
5. Lat. 59° 34′ S. Long. 106° 28′ 13″ W. 5 fathoms (4 spec.).
6. Lat. 61° 13′ 30″ S. Long. 173° 33′ E. (Several spec.)

The tubes contain comparatively few specimens, and suggest that this species is not found in abundant shoals.

The shells show considerable variation in form (fig. 7). No differences were found in the animals, though, as they were without exception retracted into their shells, the investigation of the foot and fins was difficult. An accessory lobe was, however, found on all the fins which could be extended, and after examining numerous specimens of *L. retroversa* from the coast of Scotland, I can confirm Meisenheimer's statement (Südpolar Exped., p. 104) that the lobe occurs in this northern form. The radula appears to be much the same in all specimens, and substantially as in *L. retroversa.*

The shell varies in colour from greyish white to yellowish brown, but is always rather opaque, not striated, but covered with fine granulations arranged in no apparent order. The height of the spire varies from 1 mill. to 2 mill., the latter dimensions being rare, and the maximum breadth across the last whorl is 1 mill. The umbilicus does not vary materially in shape; it is distinct, straight, rather narrow, and I did not find the distinction in breadth mentioned by Prof. Pelseneer ('Challenger' Reports LXV., pp. 26 and 27). The mouth is subquadrangular.

The variation in the shape of the shell produces two types. Type A (fig. 7A) is tall, with very deep sutures and six or seven whorls, which increase symmetrically in size, the last not being disproportionately large. In many of these shells, as preserved, the columella is not continued at the side of the mouth. Type B (fig. 7C) is smaller and lower; the sutures are not so deep; there are only four or five whorls, and the last whorl is disproportionately large and swollen.

If these forms were sharply distinguished from one another, they might be regarded as separate species, but in a few cases intermediate variations (fig. 7B) occur, such as a tall shell with deep sutures and seven whorls, of which the last is disproportionately larger than the others. Moreover, all the variations may be found in the same tube, which seems to show that they live together in their natural state. I think that the low form in *L. lesueuri*, and some varieties of the high form, seem to be typical examples of *L. australis*. But if these forms pass into one another, and are not specifically distinguishable, they are not, in my opinion, specifically distinguishable from *L. retroversa*. Dr. Meisenheimer (Südpolar Exped., p. 103) has already identified *L. australis* with this northern form.

I have compared the contents of these six tubes with very numerous specimens of *L. retroversa* captured in the North Sea (where it seems to occur in vast quantities) and kindly lent me for examination by Prof. D'Arcy Thompson, C.B. The only points in which the whole series of Antarctic specimens can be said to differ from the northern specimens are the colour and surface of the shell. In the Antarctic forms it is opaque, not striated, and covered with a fine, irregular granulation; in the northern form it is hyaline, transparent, and finely striated, the striæ being composed of dots arranged in fairly regular, but not perfectly continuous, lines. These differences do not appear to me to have specific value. I can find no distinction in the breadth of the umbilicus or the obtuseness of the spire. Though *L. retroversa* is commonly said to have an acute spire, many of my specimens are quite as blunt at the tip as *L. australis*.

Meisenheimer (Südpolar Exped. p. 106) regards *L. rangi* and *L. lesueuri* as separate species. I confess I doubt whether this distinction will be found to hold good, but the specimens now under consideration are certainly not *L. rangi* as defined by him, for the spire is higher, an accessory lobe is present on the fin, and the umbilicus is not particularly broad.

CLIO SULCATA, Pfeffer.

Pfeffer, Uebersicht der auf S. M. Schiff Gazelle gesammelten Pterpoden, Monatsb. k. preuss. Akad. Wiss., Berlin 1879, p. 240.

Pelseneer, 'Challenger' Reports, No. LXV., Thecosomata, p. 62.

Two specimens labelled "1. 1. '02. 63° 04′ S., 175° 43′ E.", of nearly the same size and measuring about 18·5 mm. in length and 11·5 mm. in breadth. The shells are very fragile and both are broken, but they must have been about 14·5 mm. long and 8 mm. broad at the top. When the animal is inside they are coloured rosy red by the viscera, but when empty are of a bluish white. The sides are inclined towards one another, and are not parallel in any part. There are lateral keels on the anterior portion of the shell, but they disappear before the

end. The shape of the lips is doubtful, owing to the injuries that they have sustained. The anterior portion of the back seems to have been triangular. The ventral surface is not re-entrant, but flattish and only slightly convex. The dorsal surface is moderately convex. The anterior part is broken, but appears to have borne a median ridge and four lateral ridges, which disappear in the posterior half. The whole surface of the shell bears numerous fine transverse ridges. After the termination of the animal inside, the shell is produced into a thin point 4 mm. long. The embryonic shell resembles Pelseneer's figure (*l. c.*, pl. II., 9) of *Clio sulcata* rather than *Clio australis*.

The foot, wings and other portions of the animal protruded from the shell are yellow, the viscera reddish. The wings are ample, about 6 mm. long and 5 mm. wide, deeply bi-lobed and with wavy edges.

The interior of the liver is deep red. The stomach contains four large plates, bearing a conspicuous Y-shaped ridge on the outside. There also appears to be a fifth plate, smaller, indistinct and triangular, as well as a double row of minute plates. The radula is tri-seriate. The sides of the teeth are somewhat irregular and indented, but not serrulated.

I think that these specimens belong to the *Clio sulcata* of Pelseneer, *l. c.*, but feel some doubt whether that species is really identical with Pfeffer's *Cleodora sulcata*.

To the same species are probably referable a small *Clio*, to which fragments of shell are attached and two posterior ends of shells, one of which bears remarkably large and distinct transverse furrows. They are all labelled 27. 12. '01. 54° 01$\frac{1}{4}$′ S. 170° 49′ E.

CLIONE ANTARCTICA, E. A. Smith.

See E. A. Smith, Coll. 'Southern Cross' Mollusca (1902), p. 210, and pl. xxv., figs. 7, 8. See also Meisenheimer on *Clione limacina*, var. *antarctica*, in Südpolar Expedition, Pteropoden (1906), pp. 101–103.

The labels state that the numerous specimens representing this form were all captured at Winter Quarters in from three to ten fathoms, the great majority at the latter depth. They fall into two classes, chiefly distinguished by their colour, some being yellowish and generally well expanded; others, brownish or greenish grey, and much more contracted. These differences seem due to the method of preservation rather than to natural variations, and the labels make it probable that the yellowish specimens were killed with picric acid.

The measurements of a large specimen are: length, 17 mm., breadth of the body at its thickest part, 6 mm., breadth across the fins, 9 mm. The colour is usually a pale lemon yellow (probably representing an original white), sprinkled with round dots of opaque yellow. The number of dots varies greatly, but they are entirely absent in comparatively few individuals. They are much more

conspicuous in the yellow than in the grey specimens. In their natural condition the integuments seem to be semi-transparent, especially above the foot, where the buccal muscles are often clearly visible. Below the foot they are more opaque, but the blackish viscera can be somewhat indistinctly discerned. The shape is moderately stout and moderately elongate, either tapering fairly symmetrically to the terminal knob, or prolonged into a distinct tail. The majority of the specimens have preserved the three larval rings, and when they are absent it seems probable that they have been obliterated. The first ring is represented by a circular band a little below the mouth, bearing 14–18 whitish prominences set at regular intervals. Some distance below the fins and about the middle of the body is the second ring, a very distinct line often accompanied by a deep constriction. At the end of the body is found, with a few exceptions, another deep constriction dividing the tip from the rest, so that the animal terminates in a knob, which, in well-preserved specimens, is surmounted by a circular frill.

The fins are of moderate size, transparent, and show inside a network of muscles. They are of somewhat varying but rounded outline, and are never triangular or quadrilateral. In many cases the base is much narrower than the rest, and this feature is probably natural.

The two anterior lobes of the foot are fairly ample and inclined so as to form an acute angle. They are attached to the body only by a narrow base, the greater part of the flap being entirely free. The posterior lobe is an acute-angled triangle, rather long and thin, but proportionately to the size of the animal larger and stouter than in *Clione limacina.*

In specimens in which the buccal parts are fully everted there may be seen two pairs of tentacles, three pairs of buccal cones, and a pair of hooksacks. The anterior tentacles are distinct and fairly large. The posterior tentacles are small, and in most specimens can only be found by following the nerves, having become invisible owing to retraction. The buccal cones are soft in the best preserved specimens, but very distinct. The middle one on either side is the largest. The two which are nearest to the foot are set close together, but are separated from the dorsal cone by a somewhat larger interval (fig. 11a). The hook sacks, which are not unfrequently everted in the form of two bundles, contain 60–70 yellowish hooks, slightly curved and somewhat hollowed out on the inner side. They are set in several rows, those at the end being smaller than the rest and forming a bundle.

There are no jaws. The radula (fig. 10) consists of about thirty rows, which have a maximum formula of 8. 1. 8, but the median tooth is very small, and is only found in one or two of the hindmost rows. Except in this posterior portion, the radula is split into two halves, which extend over two protuberances towards the right and left, so that the whole organ has somewhat the shape of the letter Y, and in the greater part of its length offers no place for a median tooth. This disposition was constant in all the radulæ examined, and seems to be natural and not due to

distortion. The following is an analysis of a radula of 32 rows, row No. i. being the hindmost:—

Rows i–ii .	8 1 8,	the median tooth being smaller in i than in ii.
Rows iii–ix .	8 0 8.	
Row x . .	7r 0 r7,	where r indicates a rudimentary lateral.[1]
Rows xi–xiv .	7 0 7.	
Row xx . .	6r 0 r6	,, ,, ,, ,,
Rows xxi–xxvi.	6 0 6.	
Rows xxvii–xxx	5 0 5.	
Row xxxi .	4 0 4.	
Row xxxii .	3 0 3.	

The shape of the teeth is much as in *Clione limacina*, except that the median teeth (11gh) are markedly smaller and less distinctly cuspid, and that the laterals in the hindmost rows (11ef) have forked bases. It is noticeable that several specimens have been preserved in the act of holding and apparently eating small elongate fishes, which are still attached to them (fig. 12).

In *Cl. limacina* the penis is large, frequently found exserted, and provided with a large accessory organ (*vide* Boas's figure reproduced by Meisenheimer in Die Arktischen Pteropoden, p. 415); but these characters are not found in any of the present specimens of *Cl. antarctica*. The penis is small, invariably retracted, and no accessory organs were discovered. Too much stress should not be laid on this difference, for no doubt the accessory organs may have a very different appearance in the same species when exserted and when retracted.

The presence of the larval rings and the small size of the penis naturally suggest that this form is immature, and it is also noticeable that the specimens were all captured between the months of November and March (though in different years), most of them in January and February. This certainly makes it probable that they are all in the same and possibly not adult stage of development. On the other hand, it is clear from a comparison of Arctic and Antarctic specimens of the same size that the young *Clione limacina* is not more like *Cl. antarctica* than are the full-grown individuals. Also the type specimens of *Clione antarctica*, captured by the 'Southern Cross' off Cape Adare and lent to me for examination by the kindness of Mr. E. A. Smith, I.S.O., resemble those found by the 'Discovery' in most external points except the colour, which is dirty green with purplish spots, a difference no doubt due to the method of preservation. The length is 20 mm. or a little less, the larval rings are more or less distinctly visible, the fins, foot, and buccal cones are as in my specimens.

[1] The conformation of the radula may be due to one or both of two causes:—(*a*) In most opisthobranchs the front, that is the earliest rows of the radula, contain fewer teeth than the posterior or later rows. (*b*) As, in this case, the radula is split into two portions, it is possible that not only the central tooth, but the inner laterals on either side are worn away, in which case r would indicate a vestigial tooth.

These specimens found by the 'Discovery' seem referable to *Cl. antarctica*, E. A. Smith (*l. c.*). They can hardly be identified with *Cl. longicaudata*, *Cl. flavescens* or *Cl. punctata*, because those species, though imperfectly known, are said to have only one or two, and not three pairs of buccal cones. In my opinion they are also specifically distinguishable from *Clione limacina*, though the species are, no doubt, nearly allied. The superficial difference in appearance is striking, and the divergent characters of the two species may be tabulated as follows :—

Clione antarctica.	Clione limacina.
1. The part of the body behind the fins is shorter than in the Arctic form. A specimen 18 mm. long consists of 6 mm. head and fins + 12 mm. body. There is a distinct neck behind the fins.	1. A specimen 18 mm. long consists of 2·5 mm. head and fins + 15·5 body. The broadest part of the body is just behind the fins, and as far as there is a neck it is between or above the fins.
2. Considerably smaller than the Arctic form. Few individuals exceed 20 mm., even when artificially extended. E. A. Smith gives 22 mm. as the length ; presumably the maximum of his specimens.	2. Specimens 40–45 mm. in length are frequent.
3. The integuments are thicker, firmer, and less transparent than in the Arctic form. In most specimens they are plentifully besprinkled with opaque yellow spots, sometimes a little raised.	3. The integuments are thin and transparent. Though spots are present they are not conspicuous, and as a rule can only be seen when carefully sought for. The whole animal is flabby, and almost gelatinous.
4. Three, or at least two, larval rings are habitually present in individuals measuring 15 mm. or more in length.	4. No larval rings found in individuals measuring as much as 10 mm. When traces of the posterior ring are found in small specimens it is not shaped as in *Clione antarctica*.
5. The base of attachment for the anterior lobes of the foot is a narrow band. The posterior lobe is larger and stouter in proportion to the anterior lobes than it is in *Clione limacina*.	5. The base of attachment for the anterior lobes is broad.
6. There is an interval between the dorsal cone and the other two. The median cone is the largest.	6. The cones are equidistant. The dorsal is the largest and the ventral smallest.
7. Median tooth very small, and present only in hindmost rows of radula. Laterals in hindmost rows have forked bases. The number of laterals gradually increases from 3 to 8, the innermost teeth of the half row being sometimes rudimentary.	7. Median tooth larger, and present in all or most rows. Laterals with forked bases not found. The number of laterals does not increase so markedly, and the rudimentary teeth are found at the outer ends of the rows.
8. Penis small, and presence of accessory organ doubtful, though not disproved.	8. Penis proportionately much larger, and provided with a large accessory organ.
9. The visceral mass extends backwards almost into the posterior third of the body.	9. The visceral mass is more compact and rounded, extending only a little way behind the fins.

Spongiobranchaea australis, D'Orb.

See especially Pelseneer, 'Challenger' Report LVIII., pp. 18–20; Meisenheimer, 'Valdivia,' pp. 47–49; *id.*, Südpolar Exped., pp. 99–101.

One specimen labelled "Winter Quarters, 19. 11. '03. Mosquito net, 10 fathoms." Four others labelled "21. 11. '01. Lat. 55° 31′ S., Long. 156° 19′ E.; 15 fathoms." These localities support the idea that the species is circumpolar.

A large elongated specimen is about 30 mm. long and 8 mm. broad, another of about the same volume is contracted and stouter, measuring 22 mm. in length and 11 in breadth. The colour of the body is violet, grey or brown, with ill-defined bands of lighter colour round the median constriction and the posterior gill. The buccal parts and the appendages which bear the suckers are yellowish white, and contrast strongly with the body colour. The foot is bluish with yellow edges, the fins yellowish.

The lateral gill is hardly visible in any of the specimens. It is at most an inconspicuous bladder-like projection which interrupts the median constriction, and is lighter than the surrounding parts. The posterior gill is distinct and well-developed. The median lobe of the foot is long and tapering, the side lobes are small, and the space between them bears a few deep furrows. The parts behind the head, including the fins, are much contracted, but in the only specimen where the fins can be seen they appear to be about 6 mm. long, and broader, and more deeply lobed than previous authors have described.

The buccal parts are everted in one specimen. The large proboscis bears a papilla as described by Pelseneer, and at its base are two large and distinct tentacular flaps. Each of the acetabuliferous appendages bears 8 stalked suckers, which increase in size upwards. The two lowest are very small; the upper ones are about 1 mm. wide. Just before the radula is the jaw, which appears to be a collection of small straight spines or teeth. At the sides of the radula are two small short hook-sacks, filled with hooks of various shapes. The formula of the radula is about 26 × 8. 1. 8, and the teeth are as in Pelseneer's plates. The median tooth is tricuspid. The laterals are longish, slender, and curved at the tips. The first lateral bears a denticle on the inner side of the base which is not found in the others.

Winter Quarters appears to be the furthest southern record of *Sp. australis*, which is probably circumpolar, since it is now recorded from Long. 60° W., and Long. 5° E. to Long. 30° E, Long. 54° E. and Long. 167° E. It is recorded from as far north as Lat. 35° S.

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2. EYDOUX ET SOULEYET.—Description sommaire de plusieurs Ptéropodes nouveaux ou imparfaitement connus. Revue Zoologique, 1840.

3. IID. Voyage autour du monde, exécuté pendant les années 1836 et 1837 sur la corvette 'Bonite.' Zoologie, tome II. Paris, 1852.

4. MEISENHEIMER. Pteropoda: in the Wissenschaftliche Ergebnisse der Deutschen Tiefsee Expedition auf dem Dampfer Valdivia, 1898–1899. Jena, 1905.

5. ID. Die arktischen Pteropoden: in Fauna Arctica. Jena, 1906.

6. ID. Die Pteropoden: in Deutsche Süd-Polar Expedition, 1901–1903. ix. Band, Zoologie i. Band. Heft ii. Berlin, 1906.

7. ID. Die tiergeographischen Regionen des Pelagials, auf Grund der Verbreitung der Pteropoden. Zoolog. Anzeiger xxix. (1905), pp. 155–163.

8. MUNTHE.—Pteropoder i Upsala Universitets Zoologiska Museum. Bihang till K. Svenska Vet. Akad. Handlingar, Band 13, Afd. iv. no. 2. Stockholm, 1887.

9. PELSENEER.—Challenger Reports, vol. xix., 1887. Gymnosomata.

10. ID. *op. cit.*, vol. xxiii., 1888. Thecosomata.

11. ID. *op. cit.*, vol. xxiii., 1888. Anatomy.

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13. G. PFEFFER.—Uebersicht der während der Reise um die Erde in den Jahren, 1874–1876 auf S. M. Schiff Gazelle und von Herr Dr. Jagor auf seiner Reise nach den Philippinen in den Jahren 1857–1861 gesammelten Pteropoden. Monatsbericht der K. Akademie der Wiss. zu Berlin 1879. pp. 230–247.

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DESCRIPTION OF FIGURES IN PLATES I. AND II.

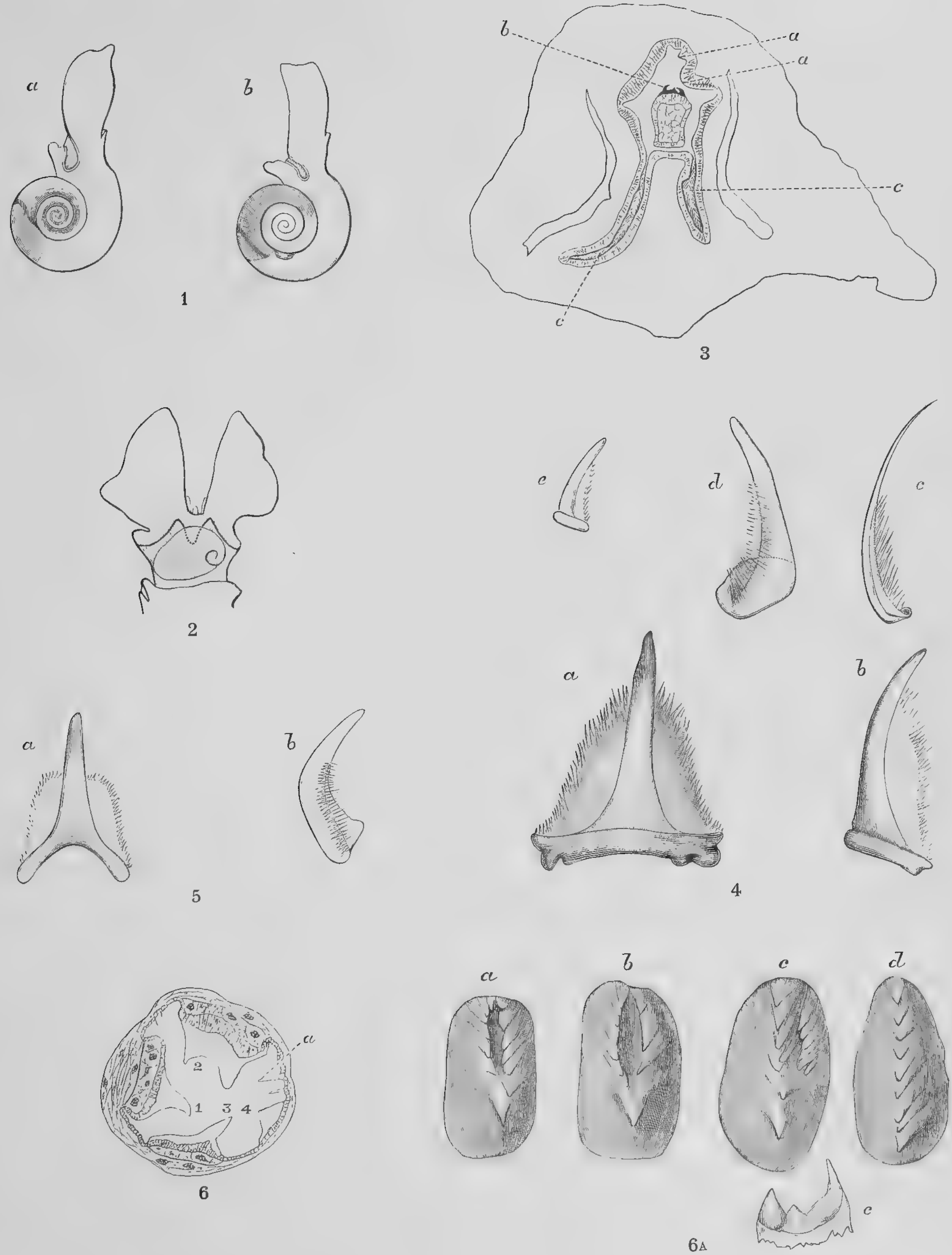
1. Distribution of colour in animal of *Limacina helicina* (a) and *L. antarctica* (b), the shell being removed.
2. *Limacina antarctica:* operculum.
3. Transverse section through buccal cavity of *Limacina antarctica:* (*aa*) folds covered with thin chitinous layer; (*b*) radula; (*c*) ciliated groove.
4. *Limacina antarctica:* teeth. 4a median; 4b–e lateral teeth.
5. *Limacina helicina:* teeth. 5a median; 5b lateral teeth.
6. *Limacina antarctica:* section through stomach. 1–4 stomach plates; (a) chitinous spines.

6a. *Limacina antarctica:* stomach plates detached.

7. *Limacina retroversa:* three varieties.
8. *Clione antarctica.*
9. *Clione antarctica:* anterior end of a specimen in which the buccal parts are everted so as to show the hook sacks. Only two of the three pairs of buccal cones are visible.
10. *Clione antarctica:* radula.
11. *Clione antarctica:* separate teeth. (a–d) laterals; (e–f) laterals from the hindmost rows; (g–h) median teeth.

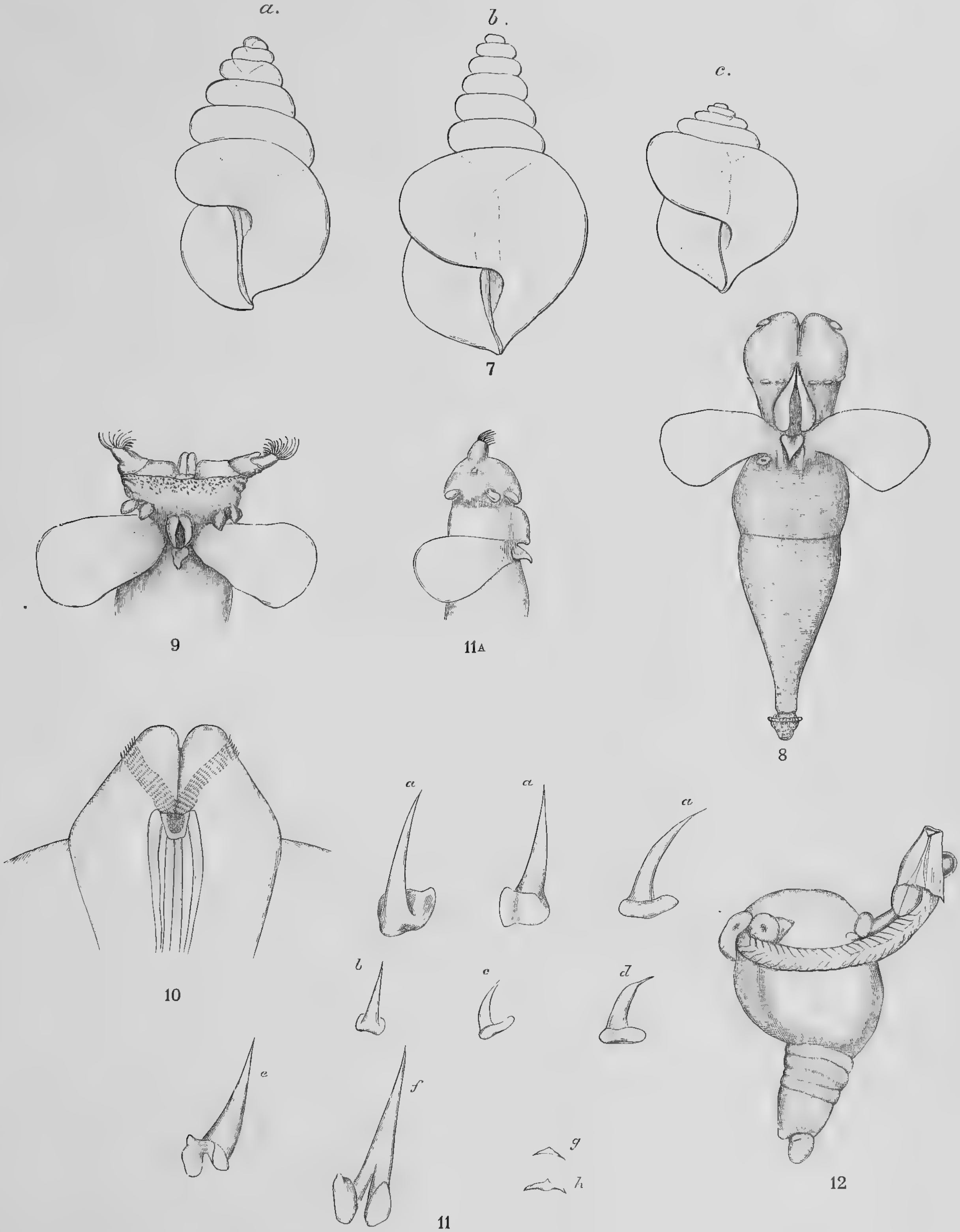
11a. *Clione antarctica:* side view showing buccal cones.

12. *Clione antarctica:* specimen captured in the act of eating a small fish.



T. J. E. del.] [Butterworth sc.

Limacina antarctica and L. helicina.



T. J. E. del.] [Butterworth sc.

Clione antarctica.

CRUSTACEA.

III.—AMPHIPODA.

By A. O. Walker, F.L.S.

(13 Plates.)

The collection of Amphipoda consists of fifty-three species, of which eighteen are new to science, belonging to forty-three genera, of which four are new. This may not appear a very large number considering the length of time the 'Discovery' was in the Antarctic Seas, yet as (with the exception of the pelagic Hyperiids taken on the voyage) all but some nine species were collected from holes in the ice at the Winter Quarters, and, therefore, from a very limited area, it appears to me to reflect great credit on the energy and perseverance of Mr. Hodgson under unusual climatic conditions. The long sojourn of the 'Discovery' in one spot enables us to observe the seasons at which different species visit shallow water, generally for the purpose of depositing their ova or young. In the case of the most abundant species, *Orchomenopsis rossi*, A. O. W., of which Mr. Hodgson says that "It was quite the usual thing to take ten to thirty thousand at a haul," I only observed one male with fully developed lower antennæ and no females with ova, though some measured as much as 25mm. The young had probably been born at a considerable depth, and had at once made their way to comparatively shallow water, the parents remaining in deep water. Again, the almost equally abundant *Eusirus propinquus* (G. O. Sars) only exceeded 25mm. in four specimens, three females with ova or young measuring 48mm., and one male measuring 50mm. This species resembles in this respect *Gammarellus* [*Amathilla*] *homari* (Fabr.), which I have observed to visit the north coast of Wales in the early spring, when alone the large adult females, and more rarely males, measuring nearly 1in. in length, can be taken between tide-marks; in the summer months every tidal pool swarms with young specimens.

As in the Arctic Amphipoda, the Lysianassidæ greatly preponderate in the number of genera, species, and individuals. The typical Gammaridæ, as restricted by Mr. Stebbing in establishing the families Melphidippidæ and Lilljeborgidæ, are unrepresented. In Professor G. O. Sars' Amphipoda of Norway there are nine genera with twenty-one species; and in Professor Herdman's Ceylon collection seven genera with fifteen species.

Among the Gammaridæ several species are remarkable for their wide distribution: *Ampelisca macrocephala* (Lilljeborg) is an abundant Arctic species, though found also in

temperate seas; *Eusirus propinquus* (G. O. Sars) and *Melphidippa macrura* (G. O. Sars) have only been recorded before from the more northern waters of Norway; *Leucothoë spinicarpa* (Abildgaard) appears to be ubiquitous, and I am unable to see any difference between those taken from the ice-holes of the Winter Quarters and those from our own seas and the tropical seas of Ceylon and the Maldives. This is an ascidiicolous species, and probably owes its wide distribution to the drifting of its host by currents and winds. The same may be said of the two spongicolous species, *Polycheria antarctica* (Stebbing) and *Colomastix pusilla* (Grube), of which the former has also been taken in Ceylon, but not further north; while the latter has been found in the British Isles, the Mediterranean, and Ceylon, but is not recorded from Norway or Arctic seas. These species must have a great capacity of adaptation to extremes of heat and cold. On the other hand, *Orchomenopsis rossi* appears to be able to exist only in water just above the freezing point.*

As species remarkable for peculiarity of structure may be mentioned the following: *Hyperiopsis australis*, of anomalous structure, and belonging to a genus so rare that previous to the capture of the single specimen in this collection only two individuals of another, but nearly allied species, *H. Voeringii* G. O. Sars, had been taken off the coast of Norway; *Thaumatelson herdmani* is the only known Amphipod which has its telson set on in a vertical plane; in the rest of the Stenothoidæ it is horizontal and generally spoon-shaped, with the concave side uppermost. *Epimeria macrodonta* is characterised by the long curved and sharp teeth on the body segments; while *Iphimedia hodgsoni* has these so densely clothed with fine spines directed backwards as to have a shaggy appearance. All the four species of *Iphimedia* in the collection are of very large size compared to the northern species, measuring from 20 to 45mm. in length. Lastly, the remarkable development of the meral joints of the last three pairs of peræopods in the adult males of *Seba antarctica*, may be mentioned.

CLASSIFIED LIST OF 'DISCOVERY' AMPHIPODA.

HYPERIIDEA.†

FAM. VIBILIIDÆ, Claus.

Genus Vibilia, H. Milne Edwards.

V. propinqua, Stebbing.

FAM. CYLLOPIDÆ, Bovallius.

Genus Cyllopus, Dana.

C. magellanicus, Dana.

FAM. HYPERIIDÆ, Dana.

Genus Hyperia, Latreille.

H. gaudichaudi, Milne Edwards.
H. macronyx, A. O. Walker (1906).

* 'Southern Cross' Paper, Journ. Linn. Soc., XXIX., p. 45 (1903).

† For references to and descriptions of the Hyperiidea, see "Bovallius, Monograph of the Amphipoda Hyperiidea" (Kongl. Svenska Vetenskaps-Akademiens Handlingar, Band 21 and 22, 1887 and 1889).

Genus Hyperoche, Bovallius.

H. lütkenides, A. O. Walker (1906).

Genus Hyperiella, Bovallius.

H. dilatata, Stebbing.

Genus Euthemisto, Bovallius.

E. gaudichaudi, Guérin.

FAM. ANCHYLOMERIDÆ, Bovallius.

Genus Euprimno, Bovallius.

E. macropa, Guérin.

GAMMARIDEA.

FAM. HYPERIOPSIDÆ, Bovallius.

Genus Hyperiopsis, G. O. Sars.

H. australis, A. O. Walker (1906).

FAM. LYSIANASSIDÆ, G. O. Sars.

Genus Cheirimedon, Stebbing.

C. fougneri, A. O. Walker.
C. hansoni, A. O. Walker.

Genus Waldeckia, Chevreux (1906).

W. obesa, Chevreux, Expn. Antarctique Française, p. 13.

Genus Aristias, Boeck.

A. antarcticus, A. O. Walker (1906).

Genus Orchomene, Boeck.

O. goniops, A. O. Walker (1906).

Genus Orchomenella, G. O. Sars.

O. pinguides, A. O. Walker.
O. franklini, A. O. Walker.
O. chelipes, A. O. Walker (1906).

Genus Orchomenopsis, G. O. Sars.

O. rossi, A. O. Walker.

Genus Tryphosa, Boeck.

T. murrayi, A. O. Walker.
T. kergueleni, Miers.

Genus Uristes, Dana.

U. gigas, Dana.

Genus Podoprionides, A. O. Walker (1906).

P. incerta, A. O. Walker (1906).

FAM. PHOXOCEPHALIDÆ, G. O. Sars.

Genus Harpinia, Boeck.

H. obtusifrons, Stebbing.

FAM. AMPELISCIDÆ, G. O. Sars.

Genus Ampelisca, Kröyer.

A. macrocephala, Lilljeborg.

FAM. STEGOCEPHALIDÆ, G. O. Sars.

Genus Euandania, Stebbing.

E. gigantea, Stebbing.

FAM. LEUCOTHOIDÆ, G. O. Sars.

Genus Leucothoë, Leach.

L. spinicarpa, Abildgaard.

FAM. STENOTHOIDÆ, G. O. Sars.

Genus Proboloides, Della Valle.

P. antarcticus, A. O. Walker (1906).

Genus Proboliella, A. O. Walker (1906).

P. typica, A. O. Walker (1906).

Genus Thaumatelson, A. O. Walker (1906).

T. herdmani, A. O. Walker (1906).

FAM. OEDICERIDÆ, G. O. Sars.

Genus Oediceroides, Stebbing.

Oe. newnesi, A. O. Walker.
Oe. calmani, A. O. Walker (1906).

FAM. EPIMERIIDÆ, G. O. Sars.

Genus Epimeria, Costa.

E. inermis, A. O. Walker.
E. macrodonta, A. O. Walker (1906).

Genus Epimeriella, A. O. Walker (1906).

E. macronyx, A. O. Walker (1906).

FAM. IPHIMEDIIDÆ, Stebbing.

Genus Iphimedia, Rathke.

I. pacifica, Stebbing.
I. echinata, A. O. Walker (1906).
I. longipes, A. O. Walker (1906).
I. hodgsoni, A. O. Walker (1906).

FAM. EUSIRIDÆ, G. O. Sars (1895).

Genus Eusirus, Kröyer.

E. propinquus, G. O. Sars.
E. microps, A. O. Walker (1906).

FAM. CALLIOPIIDÆ, G. O. Sars (1895).

Genus Oradorea, A. O. Walker.

O. longimana, A. O. Walker.

Genus Atyloides, Stebbing.

A. serraticauda, Stebbing.

Genus Stebbingia, Pfeffer.

S. gregaria, Pfeffer.

GENUS PONTOGENEIA, Boeck.

P. magellanica, Stebbing.

FAM. ATYLIDÆ, G. O. SARS (1895).

GENUS ATYLUS, Leach.

A. walkeri, Stebbing (1906).

FAM. DEXAMINIDÆ, STEBBING.

GENUS POLYCHERIA, Haswell.

P. antarctica, Stebbing.

FAM. MELPHIDIPPIDÆ, STEBBING.

GENUS MELPHIDIPPA, Boeck.

M. macrura, G. O. Sars.

FAM. LILLJEBORGIIDÆ, STEBBING.

GENUS LILLJEBORGIA, Sp. Bate.

L. dubia, Haswell.

FAM. PHOTIDÆ, G. O. SARS (part).

GENUS HAPLOCHEIRA, Haswell.

H. barbimana, G. M. Thomson.

GENUS EURYSTHEUS, Bate.

E. longicornis, A. O. Walker (1906).

FAM. SEBIDÆ, A. O. WALKER (1906).

GENUS SEBA, Stebbing.

Seba antarctica, A. O. Walker (1906).

FAM. ISCHYROCERIDÆ, STEBBING.

GENUS HEMIJASSA, n.

H. goniamera, A. O. Walker.

FAM. COLOMASTIGIDÆ, STEBBING.

GENUS COLOMASTIX, Grube.

C. pusilla, Grube.

DESCRIPTION OF THE SPECIES.

UNLESS otherwise stated, the references to Professor G. O. Sars are to his "Crustacea of Norway," Vol. I., Amphipoda, 1895; those to Mr. Stebbing (Rev. T. R. R.) are to his 'Challenger' Report; and to A. O. Walker, to the Amphipoda of the 'Southern Cross' Antarctic Expedition, Journ. Linn. Soc., London, Zoology, Vol. XXIX. (1903), pp. 38–64.

The classification of the species is, as far as possible, in accordance with that of Professor G. O. Sars, in the "Amphipoda of Norway." After the completion of this memoir (on October 30, 1906) I received, through the kindness of the author, the Rev. T. R. R. Stebbing, F.R.S., a copy of his invaluable work on the Amphipoda Gammaridea, written for "Das Tierreich." As this will be indispensable to all systematic workers on the Amphipoda, and as it contains full references to all species described and published

up to May, 1906, I refer my readers to it where my references are insufficient. The nomenclature of the genera and species has been corrected to correspond with it.

I have not thought it advisable to give synonymic lists of the older species, as I have often found these to be sources of error, owing to mistaken identifications.

The following terms are used in the descriptions :—

"Pleon" = metasome, G. O. Sars ; the first three abdominal segments.
"Urus" = urosome, G. O. Sars ; the last three abdominal segments.
"Ocular lobe" = lateral angle of the head.
"Appendage" = secondary or accessory appendage of the upper antennæ.

In the peduncle of the antennæ, the "first joint" is the antepenultimate ; in the limbs it is the basipodite. The measurements are from the tips of the uropods to the base of the antennæ, when the amphipod is straightened.

FAM. VIBILIIDÆ, Claus.

Vibilia propinqua.

Vibilia propinqua, Stebbing.

From lat. 54° 01′ S., long. 170° 49′ E. (27 Dec., 1901) to lat. 69° S., long. 174° E. (7 Jan., 1902); many specimens. The 'Challenger' specimens were taken in lat. 25° 30′ N., long. 130° E. It has recently been recorded by Mr. Stebbing from the Bay of Biscay.*

The genus *Vibilia* has been partly revised by Herr Vosseler,† but his paper does not include the following species :—

1892. 1. *V. erratica*, Chevreux, Bull. Soc. Zool. de France, 17me année, pp. 32–35.
1896. 2. *V. bovallii*, Bonnier, Camp. du Caudan dans le Golfe de Gascogne, Ann. Université de Lyon, p. 612, Pl. XXXV., fig. 3.
1900. 3. *V. hirondellei* }
4. *V. dentata* } Chevreux, Camp. scient. de l'Hirondelle (1885–8), Fasc. XVI. Amphipodes, pp. 125–134, Pls. XV., XVI.
5. *V. grandicornis* }

Of these No. 1 is distinguished by the wrist of the second gnathopods being without the usual process. Nos. 3 and 4 belong to Bovallius' division, in which the lateral angles of the last urus segment are not produced backwards. No. 3 is said to be very near to *V. viatrix*, Bov., but distinguished by the presence of a rostrum (which, according to Vosseler, occurs also occasionally in *V. viatrix*), the rounded form of the epimeral plates of the first and second pleon segments, the partial coalescence of the two last urus segments, and the great length of the carpal process of the second gnathopods. No. 4 is characterised chiefly by the large size of the teeth on the palmar margin of the first gnathopod. No. 5 has the angles of the last urus segment produced in "deux petits prolongements latéraux, larges et arrondis." In the present collection

* Trans. Linn. Soc. Zool., 2nd Ser., Vol. X., p. 31.
† Amphipoden d. Plankton Expn. 1 Teil. Hyperiidea, Mitt. Königlich. Nat. Kabinet, Stuttgart, 1901.

is a female *V. propinqua*, of 12mm., with seven or eight young, 3–5mm., which agree with *V. antarctica*, Stebbing, thus confirming Vosseler's opinion (*op. cit.*, pp. 118 and 120, note). These were taken in the steamship 'Morning,' lat. 67° 5′ S., long. 179° 30′ E.

FAM. CYLLOPIDÆ, Bovallius.

Cyllopus magellanicus.

Cyllopus magellanicus, Dana.

From lat. 51° 58′ S., long. 170° 03′ E. (26 Dec., 1901) to "past Cape Adare" (11 Jan., 1902); several specimens; length 12–14mm.

FAM. HYPERIIDÆ, Dana.

Hyperia gaudichaudi.

Hyperia gaudichaudi, M. Edw.

W.Q.,* 25 Dec., 1902, 6 fm., one young; W.Q., 6 and 7 May, 1903, one female, 25mm., one male almost as large, and an immature male, 16mm.; W.Q., 16 June, 1903, 15 fm., one female, 10mm.; W.Q., 5 May, 1904, 10 fm., one immature female and two young.

Hyperia macronyx.†

(Plate 1, fig. 1.)

Hyperia macronyx, A. O. Walker, Ann. and Mag. Nat. Hist. XVII. (1906), p. 452.

S.E. of Coulman I., 22 Feb., 1904, six specimens, immature, length of largest 10mm. W.Q., 16 April, 1903, 5 fm., one specimen. W.Q., 18 May, 1903, 10fm.; W.Q., 1 Aug., 1903, 10 fm., eight specimens.

Head shorter than the first two segments. *Eyes* occupying the entire head *Segments all free;* the three pleon-segments with a tooth on the hind epimeral angle. *Carpal process of the first gnathopods reaching the middle of the hind margin of the hand, which is ovate, less than twice as long as wide, the hind margin convex and finely serrate.* Carpal process of the *second pair reaching considerably beyond the middle of the hand;* the limb otherwise as in the first; branchiæ of first pair oblong, wider below; of second pair, pyriform.

First and second peræopods longer than the gnathopods: first joint a little wider than the fourth, which is twice as wide and about two-thirds as long as the fifth, with *five long equidistant species on the hind margin;* the fourth and fifth joints have their hind margins finely serrate. *Dactyli* slightly curved, slender, *about half as long as the fifth joint.*

Third peræopods: First joint subequal to the fifth, about twice as long as wide,

* W.Q. = Winter Quarters.

† From the long dactyli of the peræopods.

widening near the middle; fifth joint half as long again and half as wide as the fourth, its front margin finely serrate. Dactyli as in preceding pairs.

Fourth and fifth peræopods: First joint narrower than in the third pair, and the front margin of the fifth smooth. *The fourth pair are subequal to the third and about one-fifth longer than the fifth.* Dactyli as in preceding pairs.

First uropods reaching to the end of the third, second a little shorter.

Third uropods: Peduncles broad, one-third longer than the rami, which are subequal, wide at the base, and acutely pointed; the outer edge of the outer ramus smooth the rest unequally serrate.

Telson equilaterally triangular, barely reaching the middle of the peduncle of the third uropods.

This species in the length of the peræopods and the relative proportions of the last three pairs approaches *Parathemisto*, with which it also agrees in the mouth-organs, but the widely expanded and produced wrist of the first gnathopods does not agree with either G. O. Sars' or Bovallius's* definition of that genus.

Length 10mm.

Hyperoche luetkenides.

(Plate 1, fig. 2.)

Hyperoche lütkenides, A. O. Walker, Ann. and Mag. Nat. Hist. XVII. (1906), p. 453.

Lat. 57° 25′ 30″ S., long. 151° 43′ E.; one male, length 12 mm.

Like *Hyperoche lütkeni*, Bovallius,† except in the following respects:—In the second pair of peræopods (fourth pair of Bovallius) the hind margins of the fourth and fifth joints are *not serrate.* In the third pair the fifth joint *is curved.*

The telson is *triangular, with rounded apex, rather longer than the width at the base, and reaching to the middle of the peduncles of the third uropods.*

The mandibular palp has the third joint almost as long as the first and second united as figured by Bovallius for *H. lütkeni.* In this respect both species differ from G. O. Sars' figure of *H. kröyeri*, Bov. [*H. tauriformis* (Sp. Bate and Westwood‡)], in which the third joint is shorter than the second.§

In the first pair of peræopods the hind margin of the fourth joint is prolonged in the form of a strong serrate tooth; in the second pair the tooth is smaller and not serrate, but the curved portion of the end of the joint between the tooth and the base of the fifth joint is so.

Hyperiella dilatata.

Hyperiella dilatata, Stebbing.

Young specimens, abundant at W.Q. from Nov. to July, length 8–9mm.

* Bovallius, Amphipoda Hyperiidea, Part 2 (1889), p. 129.

† Bovallius, Amphipoda Hyperiidea, Part 2 (1889), p. 97, Pl. VII.

‡ British Sessile-eyed Crustacea, Vol. 2, App., p. 519.

§ Mr. W. M. Tattersall, who has kindly examined specimens of *H. tauriformis* from the W. of Ireland for me, informs me that the palp in the male resembles Bovallius's figure of *H. lütkeni*, while that of the female agrees with Sars' figure.

EUTHEMISTO GAUDICHAUDI.

Euthemisto gaudichaudi, Guérin.

Abundant from lat. 54° 01′ S., long. 170° 49′ E. to lat. 63° 04′ S., long. 175° 43′ E., mostly young—a female with ova measured 15mm.

FAM. ANCHYLOMERIDÆ, BOVALLIUS.

EUPRIMNO MACROPA.

Euprimno macropa, Guérin.

One specimen, length 16mm., 26 Feb., 1904.

FAM. HYPERIOPSIDÆ, BOVALLIUS.

HYPERIOPSIS AUSTRALIS. (Pl. 4, fig. 3.)

Hyperiopsis australis, A. O. Walker, Ann. and Mag. Nat. Hist. XVII. (1906), p. 454.

W.Q., 16 June, 1903, 15 fm.; one.

Differs from *H. Vöringii*, G. O. Sars (Norweg. N. Atlantic Expn., p. 231), in the following points:—

The lower margin of the head is *oblique*.

The first segment of the urosome has a deep dorsal depression; the second segment is the longest of the three.

The third joint of the first and second peræopods is not quite twice as long as the next two united, and is about the same width, *i.e.*, the margins are parallel, the distal three-fourths of its length.

In the last peræopods the jointing is indistinct, the very long third (or fourth) joint is finely serrate and spinulose.

The first and second uropods are biramous. In his definition of the genus Sars says that they are "simple, two-jointed," but as the rami cling closely together this might easily be an oversight.

The single specimen was not dissected (nor, probably, was Sars'), but the maxillipeds are evidently of the Gammarid type. Bovallius (Amphipoda Synopidea) has placed the genus in his tribe of Synopidea under the family Hyperiopsidæ.

FAM. LYSIANASSIDÆ, G. O. SARS.

CHEIRIMEDON FOUGNERI.

Cheirimedon fougneri, A. O. Walker.

W.Q., 8 Aug., 1902; No. 2 D., 4 fm.; one. W.Q., 1 Dec., 1902; Hut Point (123), one young.

CHEIRIMEDON HANSONI.

Cheirimedon hansoni, A. O. Walker.

Cape Adare, 24 Feb., 1904; Laminaria roots, 13–20 fm.; one, 4 mm. long.

WALDECKIA OBESA. (Pl. 2, fig. 4.)

Waldeckia obesa, Chevreux. Expn. Antarctique Française (1906), p. 13.
Charcotia obesa, Chevreux, Bull. Soc. Zool. de France, Vol. XXX. (1906), p. 163.

W.Q., 17 May, 1902, two; 4 Oct., 1902, off Castle Rock (107), 3; 27 Aug., 1902, two (one adult male); 5 March, 1903 (159), one large, one young; 10 March, 1903 (160), one large.

Female, length 18 mm.

Body tumid: First four side plates at least twice as deep as the segments, the fourth wider at the lower margin than deep, and greatly extended behind to the hind margin of the side plate of the third peræopod; this is large, convex, and subquadrate, widest below, angles rounded. The posterior angle of the first pleon segment is rounded; that of the second acute; the third has the hind margin elevated dorsally in a blunt tooth, the posterior angle upturned and sub-acute, the hind margin of the epimere hollowed out just above it, and thence convex. The first segment of the urus is carinate, the hind margin dorsally elevated in a recurved point.

Head scarcely produced in front, a little longer than the first segment, speckled with red; ocular lobe produced to an acute point reaching to the end of the first joint of the upper antennæ. *Eyes* large, dark, elongate-reniform.

Upper antennæ a little longer than the head, reaching the middle of the flagellum of the lower; first joint as long as the flagellum, second very short, third almost covered by the second; flagellum twelve-jointed, the first joint longer than the next two, setose; appendage seven-jointed, reaching beyond the middle of the flagellum.

Lower antennæ: The first joint the shortest, the second the longest, curved and widening distally, the second and third together subequal to the twelve-jointed flagellum. In the male this reaches to the urus.

Mandibles: Palp robust; first joint about half as long as the second, which is rather longer than the third, the anterior margin of which is convex for one-third its length, then straight and fringed with setæ.

First maxillæ as in *Socarnes vahlii* (Kröyer), except the inner plate, which has four or five unequal plumose setæ.

Epistome with both lobes rounded.

Maxillipeds with the inner plates squarely truncate, with rather long setæ on the ends and inner margins.

First gnathopods: Side plates more than twice as deep as wide, oblong, with the front margin obtusely angulated near the insertion of the first joint, angles rounded. First joint wide, and as long as the remainder; wrist shorter than the hand and wider than its base. The hand is simple (not subchelate), tapering to the base of the strong curved dactylus, and setose on the hind and distal half of the front margins.

Second gnathopods: First joint fully as long as the remaining joints together; wrist longer and rather narrower than the hand, the hind margin of which is a little produced; dactylus distinct.

First peræopods: Side plates narrow, widening distally, curved. Coxopodite distinct, about one-third the length of the side plate. First joint subequal to the next two, widening distally; third joint rather wider at the distal end than the first at the same point; second, third, and fourth setose, fifth spinous on the hind margin.

Second peræopods: Like the first, except the side plates (see back).

Third peræopods: Side plates as deep as the leg is long, widening below, the hind margin angulate below, the front rounded. First joint wider than long, with the hind margin excavate and setose above and obscurely crenate below; hind margin of the third joint produced to the middle of the next and terminating in a spinous point; the front margin of all the joints except the first is armed with short spines.

Fourth peræopods: First joint subovate, very obscurely crenate behind.

Fifth peræopods: First joint much wider than that of the fourth pair, the hind margin distinctly crenate in the middle.

First and second uropods: The peduncles as long as the outer rami, the inner rather shorter.

Third uropods: Rami rather longer than the peduncles, the outer rather the longer, with spines on the outer and long setæ on the inner margin.

Telson cleft nearly to its base, reaching to the middle of the rami of the third uropods.

Aristias antarcticus. (Pl. 3, fig. 5.)

Aristias antarcticus, A. O. Walker, Ann. and Mag. Nat. Hist. XVII. (1906), p. 454.

W.Q., 28 Feb., 1902, Millurdo Bay, 20 fm., one, length 15 mm.; D., 5 June, 1902, one smaller.

Body moderately compressed, without carinæ or teeth.

Head shorter than the first segment; ocular lobe produced to the end of the first joint of the upper antennæ, rounded at the apex. *Eyes* large, dark, expanded below.

Body-segments increasing in length backwards. First four side-plates about as deep as the segments, the first concealed by the second; the fourth moderately produced behind; the fifth much wider than deep. Posterior angle of the third pleon segment produced backwards, acute. First urus segment depressed in front; second and third almost concealed by the first, and perhaps coalesced.

Upper and lower antennæ subequal, scarcely reaching the end of the third segment.

Upper antennæ: First joint rather longer than the second and third, the lower margin projecting distally; second twice as long as the third, lower margin projecting. Flagellum ten-jointed, the first joint setose, as long as the next three joints, which are distally setose. Appendage five-jointed, the first the longest, the rest subequal.

Lower antennæ: First joint twice as wide as long; second and third subequal, about three times as long as the first; flagellum ten-jointed.

Mandibles as in *A. neglectus*, Hansen,* but the projection from the molar tubercle, which appears to be membranaceous, is less prominent. The third joint of the palp is straight.

First and second maxillæ as in *A. neglectus.*

Maxillipeds as in *A. neglectus.*

First gnathopods: Side plates small, rather wider than deep. First joint as long as all the rest, four times as long as wide. Wrist longer and wider than the hand, unequally setose on the hind margin. Hand not subchelate, narrowing distally, the front margin convex, the hind slightly concave, spinulose along its entire length, with four spines at unequal intervals.

Second gnathopods: Side plates semi-oval, extending to about one-third of the first joint. First joint subequal to the next three united, widening to about one-fourth of its length from the distal end, then narrowing. Wrist longer and wider than the hand, the hind margin densely setose; hand with subparallel margins, both setose. Dactylus well developed.

First and second peræopods: Side plates rounded below, those of the second pair obtusely angulated about the middle of the hind margin. The fourth joint is about half as long and twice as wide at the distal end as the fifth; the hind margin of the latter terminates in an acute angle.

The remaining *peræopods* are subequal in length and structure, robust, the third joint expanded, the fourth with both margins produced downwards; the hind margins of the first joints in the third and fourth pairs are smooth, except the lower part, which is obscurely crenate; in the fifth pair the whole margin is serrate.

First and second uropods: Peduncles subequal to the outer rami, inner rather longer; all parts sparsely spinous. The first pair extend beyond the second and these beyond the third.

Third uropods: Inner rami lanceolate, as long as the peduncle, and reaching to the end of the first joint of the outer; margins finely spinulose.

Telson about as wide at the base as long, cleft about two-thirds of its length, divisions dehiscent, rounded.

Both specimens had the third and fourth peræopods turned up over the back.

ORCHOMENE GONIOPS.† (Plate 3, fig. 6.)

Orchomene goniops, A. O. Walker, Ann. and Mag. Nat. Hist. XVII. (1906), p. 455.

W.Q., 21 Aug., 1903; two specimens, probably immature; length 5 mm.

Body-segments increasing in length backwards. *First four side-plates* deeper than the segments, narrow. *Third pleon-segment* with a small postero-dorsal carina and hind and lower margins straight, the former crenate, the posterior angle rather less than 90°.

* Vidensk. Meddel. 1887 (1888), p. 67.

† γωνία, angle; ὤψ, face.

Head shorter than the first segment; *ocular lobe broadly triangular, produced beyond the end of the peduncle of the upper antennæ. Eye* moderately large, oval, dark.

Upper antennæ: First joint three times as long as the next two united, naked. Flagellum 13–14-jointed, the first joint as long as the next three, sparsely setose on the upper side. Appendage 5-jointed, the first joint the longest, the third the shortest. *Lower antennæ* rather longer than the upper; peduncle reaching the end of the third joint of the flagellum of the upper; first joint the longest, second the shortest. *First gnathopods:* Side plates narrowed and rounded below; wrist two-thirds of the length of the hand, which is about twice as long as wide, with parallel margins, setose; palm rather oblique, convex, crenulate, defined by a spine. *Second gnathopods* as in *Orchomene humilis* (Costa) [= *O. batei*, Sars]. *Third peræopods:* Side-plates wider than the depth in front, with the usual posterior lobe; first joint about half as large as the side-plate, deeper than wide; hind margin convex, serrate, produced down to the middle of the third joint; this is much produced behind and downwards. *The fifth peræopods have the first joint nearly twice as deep as wide, and longer than the rest of the joints, including the dactylus, together*, otherwise like the third pair; the dactyli of all the peræopods are very short.

The first uropods are subequal in extent to the second, exceeding the third; the peduncle is one-fourth longer than the subequal rami, all the parts very spinous on the upper margins. *Second pair* less spinous. Peduncle in the *third pair* rather longer than the outer ramus: inner ramus not nearly reaching the end of the first joint of the outer, its inner margin minutely serrate. *Telson entire*, deeply concave above, *the end truncate with two setules:* it extends beyond the end of the inner rami of the third uropods.

The difference between the telson of this species and that of the female *O. humilis* is only one of degree, as the truncate margin is slightly concave.

Orchomenella pinguides.

Orchomenella pinguides, A. O. Walker.

W.Q., March to October, 1902; ten, $14\frac{1}{2}$ fm.; length 10 mm.

O. franklini.

O. franklini, A. O. Walker.

W.Q., 15 June, 1902; D net, nine, various sizes, length of largest 6·5 mm.

O. chelipes. (Pl. 4, fig. 7.)

O. chelipes, A. O. Walker, Ann. and Mag. Nat. Hist. XVII. (1906), p. 456.

W.Q., 28 Feb., 1902; eight., 10 fm.

Body moderately compressed; first and second segments subequal to the head and each other, remaining mesosome segments rather longer and subequal. First four side-

plates but little deeper than the segments. Hind margin of the epimere of the third pleon segment forming a rounded right angle with the straight lower margin. First urus segment as long as the remaining two, carinate; second shorter than third.

Head: The ocular lobe reaching the end of the first joint of the lower antennæ, rounded at its apex. *Eyes* large, wide-oval, dark red in spirit.

Upper antennæ: First joint about three times as long as the next two, naked; third shorter than the second. Flagellum in the female 11-jointed, the first as long as the next two, with a few long setæ below. Appendage 4-jointed, the first twice as long as the second, which is subequal to the third, the fourth minute, the whole very sparsely setose.

Lower antennæ slightly longer than the upper; flagellum 12-jointed, subequal to the peduncle.

Mouth organs as in *O. nana* (Kr.). The mandibular palp strong, with the second joint twice as long as the third.

First gnathopods: Side plates widening downwards, rounded in front, straight behind. First joint almost as long as the rest united; front margin of the wrist rather shorter than that of the hand; hand rather narrower than the wrist, slightly curved, *the hind margin produced distally so as to form an imperfect chela with the dactylus;* the oblique palm is finely pectinate and defined by two spines; the hind margins of the third, fourth, and fifth joints are densely fringed with short setæ.

Second gnathopods rather stout; side plates oblong, widening below. First joint about twice as long as the second, which is longer than the third; this has the hind margin densely pilose; wrist tumid, much longer and wider than the hand, the hind margin convex, scabrous; front margin straight, densely setose; hand densely setose, with a few strong curved and serrate spines over the insertion of the dactylus.

Second peræopods: Side plates moderately produced and angulate behind.

Third, fourth, and fifth peræopods of similar structure, increasing in size successively; the side plates of the third pair are wider than deep, and much larger than the first joints. The first joints in the three pairs are wide and obscurely crenate behind.

First uropods extending a little beyond the second, and these beyond the third; inner ramus of the third not reaching the last joint of the outer.

Telson barely reaching the end of the peduncle of the third uropods, deeply notched.

Recognisable by the peculiar form of the first gnathopods.

Orchomenopsis rossi.

Orchomenopsis rossi, A. O. Walker.

This species was taken in enormous quantity throughout the year, and is doubtless the one to which Mr. Hodgson refers in his "Preliminary Report," p. 398, as being "commonly taken 10,000 to 30,000 at a haul." It is noteworthy that it has not been

taken either by the 'Discovery' or 'Southern Cross' north of lat. 77° 50′. Male specimens with the lower antennæ developed in the manner supposed to indicate sexual maturity are very scarce, yet in a gathering from Castle Rock Seal Hole, W.Q., 14½ fm. (no date), there are a number which, though only 15 mm. long, have the flagella with 36 joints well furnished with calceoli; and from Hole 6, W.Q., 23 Feb., 1903, 130 fm. (153), there is a probably adult male of 25 mm., which appears to be the maximum size. There is some variability in the form of the third pleon segment, the hinder angle of which is less rounded in some specimens, especially the largest, than in others. Mr. Hodgson writes as follows :—

"This species was not regarded with favour when we were in Winter Quarters, and it is a matter of considerable regret that its seasonal development was not looked for; its migration it was impossible to follow. It occurred first in considerable numbers on the 17th May, 1902, when the winter was well advanced. On that occasion the trap was hauled from 56 fathoms about 4.0 p.m. and then it was so dark that I was obliged to return to the ship for a lantern. The trap contained about 10,000 of these amphipods. A thousand individuals were counted, the volume ascertained, and this formed the basis for the present estimate of number and for future occasions. Four fish were in the trap, one of them had been reduced to an absolute skeleton; on another the amphipods hung by their 'teeth' in a compact mass, completely concealing their victim. Its skin had disappeared, and I judged also about a millimetre of flesh, but the animal was still alive; the other two fish were presumably waiting their turn.

"From that date until 25th October, 1902, this species was taken generally in numbers varying between 10,000 and 30,000 at a haul, and this at all depths to 125 fm., which was our practical limit for ordinary work. Two or three times a trap was used in 173 fm., in July and August 1902, but not many amphipods were obtained—100 or so at a time. These animals swarmed over the bait to such an extent as to make it obvious they kept other animals away; otherwise the number of other animals captured was unaccountably small. Under these circumstances the presence of this amphipod was regarded as a nuisance, and as a large stock had been preserved, further captures were generally left on the ice at the mouth of the hole. My experience at the holes soon made it perfectly clear that there was no small mortality among the seals through their not being able to get to a breathing-hole in time during their wanderings, and thus affording a substantial food supply for predaceous crustacea. I came to the conclusion that these amphipods travel about the sea bottom in vast hordes in search of food, a conclusion further accentuated by the fact that from 25th October to 27th December, 1902, they completely disappeared from all the traps; stationary traps were not used during the same period of 1903. From October to January is the seals' breeding season, and at this time they remain, for the most part, close inshore. The place nearest the ship where they congregated most was among the pressure ridges at Pram Point. These ridges are formed by the 'Barrier' ice intruding into the Sound between White Island and Cape Mackay and pressing against the land at Pram Point. As the ice did

not go out during the season of 1902–3, the principal ridge became more than a mile long, the ice being pressed up to a height of twenty or thirty feet at the point of greatest pressure. Considering that the mortality among the seals would be much increased during the breeding season, it occurred to me that the amphipods might have migrated close inshore, more especially to Pram Point, as an area where a superabundant supply of food might be obtained. I went to investigate this matter, but the seals had made their holes among the irregular blocks of ice piled up in a confused manner. I found that the hole from the surface usually led on to a platform some two or three feet below; the hole which completed the passage through the ice had no relation to the one above, and was generally at some distance from it, and quite invisible from my point of view. As it turned out, I could not get a trap down any of the holes, so that the presence of these amphipods on the breeding-grounds of the seals is uncertain, and no explanation of their desertion of the traps in deeper water is forthcoming."

TRYPHOSA MURRAYI.

Tryphosa murrayi, A. O. Walker.
T. adarei, A. O. Walker.

This is another abundant species, though not nearly so much so as *O. rossi*. The largest female measured 30 mm. It appears to occur from Cape Adare to lat. 77° 50′, and was taken at the Winter Quarters throughout the year.

The examination of a large number of specimens has convinced me that the characters relied upon for the separation of *T. murrayi* and *T. adarei*, viz., the form of the hind margin of the third pleon segment and the carina on the first urus segment are very variable, and I have therefore united them.

TRYPHOSA KERGUELENI.

Lysianassa kergueleni, Miers.
Hippomedon kergueleni (Miers), Stebbing.
Hoplonyx kergueleni (Miers), A. O. Walker.

Cape Wadsworth, 8–15 fm., 15 Jan.,1902, one, small; W.Q., 15 June, 1902, one, length 13 mm.; W.Q., 20 Sept., 1902, Castle Rock, 14½ fm., three.

URISTES GIGAS.

Uristes gigas, Dana.
Tryphosa antennipotens, Stebbing.

Past Cape Adare, 11 Jan., 1902, one specimen.

PODOPRIONIDES.

Podoprionides, A. O. Walker, Ann. and Mag. Nat. Hist. XVII. (1906), p. 457.

Resembles *Podoprionella*, G. O. Sars, in the chelate first gnathopods and the deeply serrate first joints of the last three peræopods, but differs in the less compact

body, the structure of the mandibular palp and of the outer ramus of the third uropods. From *Podoprion*, Chevreux,* it differs in having the first joint of the fourth and fifth peræopods serrate like the third.

PODOPRIONIDES INCERTA. (Pl. 5, fig. 8.)

Podoprionides incerta, A. O. Walker, Ann. and Mag. Nat. Hist. XVII. (1906), p. 457.

W.Q., 29 Aug., 1902, Hole 12, D net, one specimen; length 2 mm.

Body not very compact; the anterior side plates small.

Upper antennæ reaching a little beyond the peduncle of the lower; appendage 2-jointed, the first twice as long as the second, which has a tuft of very long setæ at the extremity.

Lower antennæ: Peduncle stout, margins of third joint produced. *Mandibular palp with the third joint more than half as long as the second, narrow, pectinate.*

First gnathopods: Side plates less than half the length of the first joint, rounded in front, straight behind, with a notch and a spine above the angle. First joint rather longer than the remaining five, widening distally; second and third joints subequal; wrist subequal to the hand; *the hind margin of the hand is short, convex and prolonged in a spine-like process, which is slightly curved inwards to meet the point of the curved dactylus, forming a completely chelate joint; palm very oblique, smooth.*

Second gnathopods: Side plates oblong, about twice as deep as wide, angles rounded. First joint hardly as long as the next three; second longer and wider than the third; wrist about twice as long as the hand, which is oblong, setose on both margins, palm transverse. The last three pairs of *peræopods* have the first joints broadly ovate, the hind margins deeply serrate, as in *Podoprion*, Chevreux, and *Podoprionella*, Sars.

Uropods: First and second subequal in extent and scarcely exceeding the third pair; *the outer ramus in this pair has two subequal joints* and is but little longer than the inner. The telson could not be made out.

The single specimen was not dissected; the mouth-parts therefore could not be described.

FAM. PHOXOCEPHALIDÆ, G. O. SARS.

HARPINIA OBTUSIFRONS.

Harpinia obtusifrons, Stebbing.

W.Q., Oct.–Nov., 1902, Hut Point; three, length of largest 6 mm. W.Q., 15 June, 1902, D net, twelve young.

* Mémoires de la Société Zool. de France, Tome IV. (1891), p. 6, Pl. I.

FAM. AMPELISCIDÆ, G. O. Sars.

Ampelisca macrocephala.

Ampelisca macrocephala, Lilljeborg.

Coulman Island, 13 Jan., 1902, 100 fm. ; two males, length 18 mm.

In these specimens the upper and lower antennæ appear to be subequal, and reach to the urus. They (especially the upper) are therefore considerably longer than in the northern form as figured by G. O. Sars. The lower margin of the first joint of the fifth pair of peræopods is more truncate than in the female specimen in the 'Southern Cross' collection.

FAM. STEGOCEPHALIDÆ, G. O. Sars.

Euandania gigantea ?

Euandania gigantea ? Stebbing.

W.Q., 20 Aug., 1903, Hole 12, D net; one specimen, length 9 mm.

Probably a young specimen ; not dissected.

FAM. LEUCOTHOIDÆ, G. O. Sars.

Leucothoë spinicarpa.

Leucothoë spinicarpa, Abildgaard.

W.Q., 13 Sept., 1902, two ; 5 Nov., 1902, one ; 11 Nov., 1902, one ; 28 Nov., 1902, one ; 8 Sept., 1903, two ; 30 Sept., 1903, one.

I am unable to see any difference between these specimens and the European and Ceylon forms. The largest measured 15 mm.

FAM. STENOTHOIDÆ., G. O. Sars.

Proboloides antarcticus. (Pl. 5, fig. 9.)

*Proboloides** *antarcticus*, A. O. Walker, Ann. and Mag. Nat. Hist. XVIII. (1906), p. 13.

W.Q., from Feb. to Dec., 1902, sponges, Hut Point, etc.

Female: Epimeres of the third pleon segment with straight hind and lower margins, forming a rounded subrectangular posterior angle. Ocular lobe not very prominent, subrectangular. *Eye* round, colourless in spirit.

* There can be little doubt that Dr. Della Valle is right in holding that *Probolium polyprion*, Costa, was a true *Stenothoë*. The very nearly allied *Stenothoe gallensis*, A. O. Walker, certainly is so, the mandibles having no palp and the lobes of the maxillipeds being separate. In *Proboloides antarcticus* the expansion inwards and distal prolongation of the joint which corresponds to the outer lobe of the maxilliped are sufficiently developed to form a rudimentary lobe. A similar form is shown by Stebbing in his figures of *Metopa* on Pls. XL. to XLVI., and as all these species have mandibular palps, and the inner or basal lobes of the maxillipeds distinct, they should now be included in *Proboloides*, Della Valle, with the exception of *M. ovata*, which, from its two-jointed mandibular palp, might be referred to *Proboliella* but for the narrow first joints of the peræopods.

Antennæ subequal, as in *P.* (*Probolium*) *gregarium* (G. O. Sars) ; no appendage.

Mouth organs as in *P. gregarium.*

Maxillipeds with the inner lobes very small and separate, the outer (masticatory) represented by a dilation and distal prolongation of the inner margin of the joint.

First gnathopods : Wrist subequal in length to, but wider than, the hand ; the hind margins of both convex and setose, otherwise as in *P. gregarium.*

Second gnathopods : Side-plates with the front and lower margins forming a continuous curve, hind margins almost straight. First joint as long as the next four ; third joint rather acutely produced behind ; wrist with a rounded process ; margins of the hand subparallel ; hind margin subequal to the palm, which is defined by a small tooth and two spines.

First and second peræopods resembling those of *P. gregarium,* the second being stouter and more spinous than the first, but the side-plates are more rounded in front.

Third peræopods : The posterior lobe of the side-plate is suboval and considerably produced downwards. The concave hind margin of the narrow first joint is prolonged almost to the end of the second, terminating in a divided lobe.

Remaining *peræopods* as in *P. gregarium.*

The second uropods are subequal in extent to the third, the peduncle subequal to the inner ramus, which is almost twice as long as the outer ; this has two spines, the inner and peduncle several.

Third uropods : The peduncle is shorter than the ramus and has five spines ; the first joint of the ramus is subequal to the second and has three spines.

The *telson* reaches the end of the peduncle of the third uropods and has three spines on each margin.

Length, 3·5 mm.

The male is considerably larger than the female. Upper antennæ reaching to the middle of the flagellum of the lower. Peduncle of the lower twice as wide as that of the upper, the second joint as long as the flagellum, which is 12-jointed, the first joint as long as the next three.

First gnathopods : Wrist considerably longer and but slightly wider than the hand.

Second gnathopods : Side-plates rounded in front, hind margin concave, the posterior part of the lower margin irregularly serrate. First joint rather longer than the next three ; second with a prominence on the front ; wrist produced behind. Hand as long as the three preceding joints, subtriangular, hind margin shorter than the front and ending in a sharp tooth ; palm deeply excavate, with a central tooth and a denticulate ridge near the base of the dactylus.

In a younger male the palm is less deeply excavate, the central tooth wider, blunter, and denticulate, and the ridge as wide as the excavation.

Associated with this species were two or three females characterized by the concave lower margins of the side-plates of the second peræopods.

There are other slight differences, such as the greater relative width of the first joint of the upper antennæ; more slender gnathopods; the third joints of the fourth and fifth peræopods more acutely produced, etc. It is possible that it might prove to be a distinct species if the males were known.

PROBOLIELLA.

Proboliella, A. O. Walker, Ann. and Mag. Nat. Hist. XVIII. (1906), p. 13.

Mandibles with a two-jointed palp.

First maxillæ with a two-jointed palp.

Maxillipeds with the inner plates divided to the base; the outer more or less developed.

Second peræopods not stronger than the first; *third peræopods* with a narrow first joint; *fourth* and *fifth* with an expanded first joint.

P. TYPICA. (Pl. 6, fig. 10.)

P. typica, A. O. Walker, Ann. and Mag. Nat. Hist. XVIII. (1906) p. 14.

W.Q., Hut Point, 11 Nov., 1902, one; 13 Oct., 1902, one; 18 Feb., 1904, one. All females.

Female—

Body tumid. Posterior angle of the third pleon segment produced and rounded.

Eye small, round, colourless in spirit.

Upper antennæ without an appendage, reaching to the middle of the flagellum of the lower; the third joint half as long as the second; flagellum seven-jointed, as long as the two last joints of the peduncle.

Mandibles bent downwards from the base of the palp and narrowed towards the coarsely toothed cutting edge; the palp more than half the length of the mandible; the first joint less than one-fourth as long as the second.

Maxillipeds: Inner plates divided; outer distinct, though narrow; first and second joints of the palp subequal, the third longer.

First gnathopods: Wrist shorter and narrower than the hand; palm very oblique, about as long as the rest of the hind margin, spinulose, and defined by two or three long spines.

Second gnathopods: Side-plates oblong, convex in front, straight behind, the angles rounded with a small tooth. First joint strong, as long and more than half as wide as the hand, fringed with setæ before and behind; third joint produced behind to a very acute point, which extends a little beyond the carpal process. Hand subelliptical, the palm longer than the rest of the hind margin, convex, spinulose, and defined by a strong tooth, beyond which is a smaller tooth and a group of spines.

First peræopods: Side-plates oblong, angles rounded, margins parallel; first

joint curved, oblong, almost as long and three times as wide as the next three; third and fifth subequal, fourth rather shorter; dactylus slender, two-thirds of the length of the preceding joint.

Second peræopods: Side-plates subtriangular, front margin straight, lower and hind margins convex. The legs as in the first pair.

Third peræopods: First joint narrow, oblong, straight.

Fourth and fifth peræopods alike; first joint oval, deeper than wide, hind margin smooth.

The *uropods* are subequal in extent and sparsely spinous; the peduncle of the third pair is subequal to the first joint of the ramus, which is also subequal to the second joint.

Telson not reaching the end of the peduncle of the third uropods, narrowing rather abruptly to a point with two spines on each side before the middle and one beyond.

Length, 3 mm.

THAUMATELSON.*

Thaumatelson, A. O. Walker, Ann. and Mag. Nat. Hist. XVIII. (1906), p. 15.

General characters of *Metopa.*

Palp of the first maxillæ two-jointed.

First gnathopods distinctly subchelate.

Telson large, entire, oval and *set in a vertical plane on its longer edge.*

T. HERDMANI. (Pl. 7, fig. 11.)

. *herdmani*, A. O. Walker, Ann. and Mag. Nat. Hist. XVIII. (1906), p. 15.

W.Q., Oct., 1902; 8-net, Hut Point; from Sponges. One spec. W.Q., 13 Feb., 1904; D-net, Hut Point; one.

Body as in *Metopa:* the fourth side-plate unusually large, covering the bases of the last three pairs of peræopods. The last two pleon segments with a postero-dorsal tooth. Segments of the urus coalesced.

Antennæ: subequal, longer than the head.

Upper antennæ: First joint longer than the second, which is rather shorter than the third, and has the upper margin produced; there is no appendage. Flagellum shorter than the peduncle.

Lower antennæ: Peduncle subequal to that of the upper, second and third joints subequal and together longer than the flagellum.

Maxillipeds: Inner lobes reaching half-way up the narrow outer lobes, apparently divided rather further down than in *Metopa*; outer lobes, as in *Proboloides*, a mere slight expansion of the inner margin of the basal joint, which is produced distally half the length of the next joint, which, as well as the remaining joints of the palp, is short

[*Rectius* Thaumatotelson.—ED.]

and wide; the third joint expanded distally; dactylus wide at the base, the inner margin pectinate.

First gnathopods: First joint straight, subequal to the next four; second shorter than the third, which narrows distally to a rounded point; wrist triangular, about half as long as the hand, which is subquadrate, with transverse, rather convex, palm as long as the hind margin and defined by a group of spines.

Second gnathopods: First joint straight, widening distally, almost as long as the next four; third joint oblong, ending behind in a blunted acute angle; wrist produced behind a little beyond the base of the hand; this is subtriangular, nearly twice as long as the width at the palm, which is the widest part; front margin straight; distal half of hind margin slightly concave, ending in a tooth behind which is a short and a long spine defining the transverse, slightly convex and spinulose palm.

First and second peræopods: Similar; all the joints narrow. Side-plates of the first pair oblong, about twice as deep as wide, the angles rounded; those of the second broadly subtriangular, more rounded behind than in front, the lower margin slightly concave or sinuous.

Remaining peræopods resembling the first and second, the first joints narrow.

First uropods extending beyond the second, the rami subequal, shorter than the peduncle; in the second pair the upper ramus is shorter than the lower.

The single ramus of the *third uropods* is subequal to the peduncle, the first joint rather longer than the second.

Telson as described above.

Length 2·5 mm.

FAM. OEDICERIDÆ, G. O. SARS.

OEDICEROIDES NEWNESI.

Oediceros newnesi, A. O. Walker.

5 June, 1902, two; length of female with ova, 7 mm. W.Q., 15 June, 1902, six young. Tent Island, 3 Jan., 1904, 20 fm., one.

A better mounting of the mandible than was effected with the 'Southern Cross' specimen shows that the molar tubercle is well developed, with a toothed grinding surface. It must therefore be referred to the genus *Oediceroides* Stebbing.

The mandibular palp has the second joint wider and about one-fourth longer than the third, being widest about one-third of its length from the base.

OE. CALMANI. (Pl. 6, fig. 12.)

Oe. calmani, A. O. Walker, Ann. and Mag. Nat. Hist. XVIII. (1906), p. 15.

Coulman Island, 13 Jan., 1902, 100 fm., two females. Flagon Point, 23 Jan., 1902, one young. Barrier, 29 Jan., 1902, 100 fm., one.

Female: Body scarcely compressed laterally. Mesosome segments very short, subequal, the first with a transverse fold. First pleon segment about twice as long, the second shorter, the third much longer than the first; the last mesosome and first two pleon segments with a dorsal tubercle near the middle; the third pleon and first urus segments with a shallow carina; hind margin of the third pleon segment rounded. First four side-plates as deep as the segments.

Head: Rostrum shorter than the rest of the head and reaching the end of the first joint of the upper antennæ, the lower margin scarcely concave; the front sulcate, not carinate. Eyes contiguous, occupying the greater part of the rostrum, varying from red to brown.

Upper antennæ not quite reaching the end of the second joint of the lower; the first joint rather longer and twice as wide as the second, widening distally; the second twice as long as the third; first and second with tufts of plumose setæ. Flagellum ten-jointed, shorter than the peduncle.

Lower antennæ: First joint wider than long, setose; second stout, longer than the third, which has a long spine near the middle and another at the distal end, both on the lower margin.

Mandibles: Primary cutting edge with two short blunt teeth, secondary with a long and a short tooth, molar tubercle bicuspidate; first joint of the palp very short and obconical; second subequal to the third in length, but more than twice as wide near the base, both joints with long spine-like setæ on the front margin.

Third peræopods: First joint oblong-oval, the front margin somewhat produced, both margins with long setæ, on the distal half; third joint almost as wide as the first, densely setose.

Fourth peræopods: First joint ovoid, the hind margin denticulate, sparsely setose; the front margin with longer setæ which are plumose at the lower angle, otherwise as in the third pair. The dactyli in all the peræopods except the last (which are broken in all the specimens) are almost as long as the fifth joints.

The gnathopods and rest of the animal agree with *Œ. rostrata*, Stebbing, from which species this differs in the conspicuous eyes, the different form and proportions of the rostrum, mesosome segments, first joint of the upper antennæ and second joint of the mandibular palp.

Length of female 30 mm.

FAM. EPIMERIIDÆ, G. O. SARS.

EPIMERIA INERMIS. (Pl. 8, fig. 13.)

Epimeria inermis, A. O. Walker.

Jan. 22, 1902, 500 fm., two females, length 35 mm.; W.Q., 14 July, 1903, Hole 10, 107 fm., one dissected; W.Q., 2 and 4 Sept., 1903, one; W.Q., 8 Sept., 1903, one young.

As the single specimen in the 'Southern Cross' collection was not dissected, the following additional details are given. The specimen from which they are taken was not full grown, and differs from the larger in the absence of the prominent convexity of the lower part of the fifth side-plate and of the dorsal carina, except on the third pleon segment.

Upper antennæ: First joint of the peduncle longer than the remaining two, swollen at the base on the lower margin; second nearly twice as long as the third; both have the upper margin produced and notched. Flagellum 28-jointed.

Lower antennæ: Basal joint produced on the inner side beyond the first joint, the upper margin in both forming an acute tooth; second joint rather longer and thicker than the third, the upper margin of which is produced and notched.

Mandibles: The palp stout, the second joint longer than the third, otherwise the mouth organs and maxillipeds are nearly as in *E. cornigera* (Fabr.).

Gnathopods nearly resemble those of *E. cornigera;* the hand of the second pair is shorter and wider at the distal end than that of the first, and is finely denticulate at the rounded and spinous palmar angle.

Third peræopods: Side plates rhomboidal; first joint with a long tooth-like process directed downwards from the upper part of the hind margin, which terminates in a sharp tooth.

Fourth peræopods like the third, except the side plate.

Fifth peræopods: Side plates rather wider at the top than the widest part of the first joint, narrowing downwards; first joint expanded above, narrowing abruptly near the middle, whence the hind margin curves outwards and ends in a tooth.

First uropods: Rami subequal, longer than the peduncle, narrow lanceolate, fringed with short spines on both margins.

Second uropods: Inner ramus not reaching the end of the first uropods; outer less than half as long and much narrower than the inner.

Third uropods not reaching the end of the longer ramus of the second pair, broadly lanceolate, subequal, longer than the peduncle, which has a prominent tooth.

Telson reaching to the base of the rami of the third uropods, tapering considerably and notched at the tip.

Length of the specimen described, 25 mm.

Epimeria macrodonta. (Pl. 8, fig. 14.)

Epimeria macrodonta, A. O. Walker, Ann. and Mag. Nat. Hist. XVIII. (1906), p. 16.

Jan. 22, 1902, 500 fm., three; W.Q., 4 Sept., 1903, Hole 12, one.

All the segments of mesosome and pleon, with the exception of the first two segments, of which the first is twice as long as the second, armed with lateral teeth, increasing in length backwards, with longer dorsal teeth, curved and directed upwards and backwards; those of the last mesosome and first two pleon segments the longest.

First two segments of the urus with an upright dorsal tooth, that on the first segment the longer; the third segment with a lateral carina, which is turned up in a sharp tooth. First three side plates narrow, acutely pointed below, the first straight, second and third curved; the hind margin of the fourth forms an irregular crescent with acute points; the fifth has a long acute tooth directed backwards and outwards, reaching the hind margin of the sixth segment; the sixth has a small tooth; the seventh unarmed. Posterior angles of the epimeres of the pleon segments produced and acute.

Head: Lower margin of the ocular lobe produced forward in an acute tooth. Rostrum almost horizontal, slightly decurved, and much longer than the rest of the head. Eye large, round-oval, almost filling up the ocular lobe, colourless in spirit.

Upper antennæ shorter than the lower; first joint with a subequal distal tooth on each side, reaching nearly to the distal end of the lower margin of the second joint, which is subequal to the first, and has two long subequal distal teeth on the upper side, reaching to the seventh joint of the flagellum; third joint about half as long as the second, with a small distal tooth on the lower margin. Flagellum 32-jointed, slender.

Lower antennæ: Basal joint with four or five unequal teeth; first joint very short; second and third more than twice as long, subequal, the former with a small distal tooth below. Flagellum slender, reaching in the largest specimen to the fifth segment.

Mouth organs and maxillipeds as in *E. cornigera.*

First and second gnathopods almost alike, more slender than in *E. cornigera*, and almost exactly like those of *E. parasitica*, M. Sars.

First and second peræopods: First joint subequal to but wider than the third; fourth joint about half as long as the third; fifth considerably longer than the fourth.

Third peræopods: First joint rather longer than and twice as wide as the third, the hind margin concave, with a rounded protuberance at the proximal end and a large, very sharp tooth at the distal end directed backwards; front margin concave in the middle; front margin of the second joint produced downwards in a small tooth; third joint acutely produced behind.

Fourth peræopods: Hind margin of the first joint convex in the middle, otherwise like the third pair.

Fifth peræopods: First joint wider than that of the fourth pair, the margins more convex above, but the hind one concave above the strong and sharp distal tooth; front margins of first and second joints not produced.

The *uropods* are all subequal in extent; the second pair has the outer ramus one-third shorter than the inner; in the first and third pair the outer rami are scarcely the shorter; the peduncles of the third pair have the upper margins produced behind in an acute tooth, and are about one-third of the length of the rami; these are long and narrow, lanceolate, with a few small spines on both margins.

The *telson* narrows distally, the sides are slightly convex, and the divisions formed by a notch extending to about one-third of the length are subacute.

Length 33 mm.

This species has a superficial resemblance to *Acanthozone* (Boeck.*), from which it differs in the shape of the head, and *Acanthechinus* (Stebbing), from which it differs in the head, mandibles, gnathopods, etc. Both these genera have the telson entire.

EPIMERIELLA.

Epimeriella, A. O. Walker, Ann. and Mag. Nat. Hist. XVIII. (1906), p. 17.

Body smooth, without dorsal teeth, except in the first segment of the urus.

Head with a very small rostrum.

Fifth pair of side plates small, oblong, wider than deep, without a projecting process.

Mandibles with the molar tubercle imperfectly developed.

Third and fourth pairs of peræopods much longer than the fifth.

Otherwise like *Epimeria.*

EPIMERIELLA MACRONYX.† (Pl. 9, fig. 15.)

Epimeriella macronyx, A. O. Walker, Ann. and Mag. Nat. Hist. XVIII. (1906), p. 17.

W.Q., 29 May, 1903, Hole 4, 5 fm., two; W.Q., 1 June, 1903; Hole 8, 10 fm., three; 26 Feb., 1904 (269), one. This last measured 25 mm.; the rest were young, measuring only 6 mm.

Head slightly produced in front. *Eyes* large, round, oval, prominent, colourless in spirit.

Mesosome smooth, first and third segments subequal, and much longer than the second; remaining segments increasing in length successively. First three side-plates about as deep as the segments, narrow, convex, and pointed below, fourth deeper than the others, narrowing below in a curved point, with the upper posterior angle produced under the fifth side-plate in an acute tooth; fifth, small, transverse, oblong, with rounded ends.

Pleon with an obscure dorsal *carina;* hind and lower margins of the third segment straight and forming a right angle.

First segment of the *urus* dorsally depressed in front, and with a postero-dorsal tooth.

Upper antennæ: First joint more than twice as long as, and much wider than, the second; third shorter than the second and subequal to the first joint of the flagellum, which has about twenty joints.

Lower antennæ subequal to the *upper;* first joint very short; second and third subequal, barely reaching to the end of the second joint of the upper.

Mandibles: Molar tubercle imperfectly developed; primary and secondary cutting

* Skandinavske og Arktiske Amphipoder, 1876, p. 229; also G. O. Sars.

† From the great length of the dactyli of the third and fourth peræopods.

edges dentate; spine row long, of about twenty spines; the palp, which is set on in front of the middle, is longer than the mandible; the first joint about one-third as long as the second, which is subequal to the third. One of the mandibles appears to be without a secondary cutting plate.

First maxillæ: Inner plate with about 12 plumose setæ on its inner margin.

First gnathopods: First joint stout, rather longer than the side-plate, and subequal to the wrist and hand united; these are subequal to each other, the wrist rather the wider; the hand is oval, the palm undefined, pectinate; the whole hind margin sparsely and unequally spinous. Dactylus with 5 spines on the inner margin.

Second gnathopods are like the first, except the palm, which is more transverse, and about half as long as the rest of the hind margin.

Second peræopods: Side-plates reaching below the second joint. First joint narrow, oblong, subequal to the third and fourth united; third rather longer than the fourth, and shorter than the fifth. Dactylus continuous with the fifth joint, as long as the third, and slightly curved.

Third and fourth peræopods subequal: First joint oblong, twice as long as wide; third joint half as long as the first, acutely produced behind; fourth joint subequal to, and fifth rather longer than the first. Dactylus very long, about one-fifth longer than the fifth joint, and tapering very gradually. These two pairs appear to be generally carried elevated over the back. In the largest specimen (25 mm.) the dactyli are not quite so long relatively.

Fifth peræopods are considerably shorter, and the first joint wider, than the third and fourth; hind margin of the first joint convex, obscurely serrate, and produced downwards in a rounded lobe almost to the middle of the third joint; this is much produced behind, and is a little shorter than the fourth, which is as long as the dactylus and shorter than the fifth joint.

First and second uropods: The rami longer than the peduncles, the outer shorter and narrower than the inner.

Third uropods: Rami nearly twice as long as the peduncle, subequal, the outer the narrower, with fine spines on both margins.

Telson, reaching to about one-fourth the length of the rami of the third uropods, deeply notched at the end, with a minute notch on the tip of each division.

The above description, with the exception of that of the external characters of the animal as seen without dissection, is taken from a young specimen 6 mm. long.

FAM. IPHIMEDIIDÆ, Stebbing.

Iphimedia pacifica.

Iphimedia pacifica, Stebbing.

W.Q., 20 Feb., 1902, 20 fm., one; 14 Jan., 1903, 130 fm., one, young, about 8 mm.; 14 July, 1903, 130 fm., one, length 24 mm.; 30 Sept., 1903, one, length 20 mm.; two on 4 Sept., 1905, one, length 30 mm.

The tooth on the first joint of the upper antennæ is much longer in the large specimens than is shown in Stebbing's figures. This is probably only a matter of age.

IPHIMEDIA ECHINATA. (Pl. 10, fig. 16.)

Iphimedia echinata, A. O. Walker, Ann. and Mag. Nat. Hist. XVIII. (1906), p. 150.

W.Q., 24 Sept., 1902, Hut Point, one, large; 24 Aug., 1903, Hole 12, D-net, three, large, 30 mm., and about twenty-five, young; 26 Sept., 1903, Hole 12, D-net, one, about 45 mm. long and 15 mm. across the back.

First segment of the *mesosome* longer than the second; the next four segments are longer than the second and subequal; the posterior angles of the first two are almost right angles, and of the next four acute. The fifth segment has sometimes a few small teeth on the hind margin; the sixth has more, and the seventh is dorsally depressed, and is longer than any of the other segments in the middle, but greatly narrowed downwards, with the hind margin more coarsely dentate. The pleon segments have strongly dentate, dorsal carinæ, with smaller teeth on each side, and on the hind margins; the posterior angle of the second is acute and upturned, and that of the third similar, but longer, and with a much longer curved tooth above it. The first urus segment is as long as the two next united, and has a dorsal depression followed by a group of upright teeth; the second and third are smooth, except for a tooth on each side of the telson. The first three pairs of side-plates narrow downwards to a point, the second and third curved; the fourth, fifth and sixth have a strong tooth with serrate edge directed outwards. The number of teeth appears to vary considerably in different specimens.

Head: Rostrum as long as the rest of the head, acute, decurved; ocular lobes rounded; *eyes* prominent, round, colourless.

Upper antennæ: First joint with two distal teeth on the upper side; second joint with a serrate tooth reaching almost to the end of the first joint of the flagellum on the upper margin, and a short one on the lower; third joint short. In a young specimen a rudimentary appendage was seen, but in a larger (though not adult) this was only indicated by two setæ. First joint of the flagellum as long as the next three.*

Lower antennæ subequal to the upper; second and third joints subequal; the three peduncular joints have the upper margins produced; the basal joint has a prominent curved tooth on its upper side.

Mandibles, without molar tubercles, different; one, having the simple cutting edge oblique, obscurely dentate, with a tooth at the lower angle; the other having the cutting edge more strongly dentate, with a peculiar secondary apparatus in the form of a hollow chitinous cylinder with a smooth periphery. First joint of the robust palp shorter than the second, which is subequal to the third.

* In the specimen figured the antenna was curved upwards.

First maxillæ normal.

Maxillipeds as in *I. pacifica,* except the inner plates, which are oblong and almost as wide as the outer.

First gnathopods: First joint widest in the middle; wrist rather shorter than the hand, which is chelate with short spines on the immovable digit.

Second gnathopods: First joint narrow, oblong, as long as the remaining joints; wrist and hand subequal, the latter chelate with long plumose setæ on the hind margin.

First and second peræopods: First joint strong, widening distally; second as long as the fourth; third rather longer and produced behind.

Third peræopods: First joint oblong, with a median ridge and five subequal teeth on the hind margin. In young specimens the spines are fewer and less equal. The side-plates are wider than deep, with a tooth directed backwards.

Fourth peræopods: First joint rather wider than in the third pair, with fewer and more unequal teeth, and the posterior angle very acute and upturned.

Fifth peræopods: Side-plates small. First joint wider than in the fourth pair, with four unequal teeth on the hind margin, and the posterior angle still more acute and produced.

First uropods: Rami subequal, shorter than the peduncle.

Second uropods: Outer ramus two-thirds of the length of the inner which is rather shorter than the peduncle.

Third uropods: Rami wide-lanceolate and subequal, longer than the peduncle.

Telson emarginate, the outer angles reaching to the end of the peduncle of the third uropods.

The nearest ally of this fine species is *I. pulchridentata,* Stebbing, from Heard Island, from which it differs in not having the lower ends of the first three pairs of side-plates forked, and in the numerous dorsal spine-like teeth on the seventh mesosome and three pleon-segments.

I. LONGIPES. (Pl. 9, fig. 17.)

I. longipes, A. O. Walker, Ann. and Mag. Nat. Hist. XVIII. (1906), p. 151.

Coulman Island, 100 fm., 13 Jan., 1902; one, length 30 mm. (not dissected).

Mesosome wide; pleon and urus compressed. *Head,* exclusive of the rostrum, longer than the first segment; rostrum fully as long as the rest of the head, deflexed and pointed; ocular lobe rounded in front and terminating below in a strong tooth directed downwards. *Eyes* round-oval, dark, widely separated.

First segment considerably longer than the second (which is the shortest of all) and subequal to the sixth; third, fourth, and fifth shorter than the first and subequal; seventh as long as the fifth and sixth united, with two long subdorsal teeth directed backwards. The first side-plates are rather deeper than the segment, much expanded below and rounded; second and third bluntly pointed; fourth sharply pointed below,

with the hind margin produced backwards in a spur; fifth and sixth with the hinder angles acute; seventh small and subquadrate.

The first two *pleon-segments* have two long subdorsal teeth, as in the seventh segment; the lower margin of the first is narrowed, with the posterior angle obtuse; the hind margin of the second is concave with the posterior angle acute; the third segment is smooth with the posterior epimeral angle forming a short, blunt tooth and a longer curved tooth above it.

First segment of the *urus* dorsally depressed, much longer than the remaining two united.

Upper antennæ: First joint with a strong distal tooth on the inner side reaching almost to the end of the second joint.

First gnathopods with a chelate hand.

Last three pairs of peræopods increasing in length successively, the last pair extending much beyond the ends of the uropods; hind margin of the first joints smooth, more or less concave, and ending below in a subacute tooth.

Telson reaching to the base of the peduncles of the third uropods, shorter than the width at the base, rather deeply notched.

I. HODGSONI. (Pl. 11, fig. 18.)

I. hodgsoni, A. O. Walker, Ann. and Mag. Nat. Hist. XVIII. (1906), p. 152.

Coulman Island, 13 Jan., 1902, 100 fm., one.

The whole body is clothed with fine spine-like teeth directed backwards and arranged more or less in zones on the segments of the mesosome, pleon, and urus; the side-plates are also densely spinous, and appear to be a little deeper than the segments. The body is but little compressed laterally and is widest about the first and second segments of the mesosome. The *antennæ* are rather short, subequal, and directed outwards, the basal joints of the upper being a mass of branching spines. The rostrum is almost straight and about as long as the rest of the head. *Eyes* round, darkish, and far apart.

Inner plates of the *maxillipeds* folded and squarely truncate; outer broad and rounded.

The *gnathopods* resemble those of *I. obesa*, Rathke.

Length 20 mm.

The single specimen was only partially dissected.

FAM. EUSIRIDÆ, G. O. SARS.

EUSIRUS PROPINQUUS.

Eusirus propinquus, G. O. Sars.

W.Q., etc., various dates, very abundant.

The only points of difference between this form and the type are as follows: The

first pair of side-plates are produced in front to a rounded acute angle; the eyes are dark brown (in spirit) instead of light red; the antennæ have longer and more slender flagella, and the telson is less deeply divided. The two last characters, however, vary with age; thus the telson in an adult female is like that of *E. minutus* as figured by Sars, while in an immature specimen it resembles that of *E. cuspidatus*, Kr.

In the large number of specimens taken but few are adult, viz.:—

1 male, length 50 mm., W.Q., 25 April, 1903, Hole 8, 10 fm.
1 female, with young, length 48 mm, W.Q., 25 Mar., 1903, Hole 8, 10 fm.
1 female, with ova, length 48 mm., W.Q., 31 Mar., 1903, Hole 4, 6 fm.
1 female, with ova, length 48 mm., W.Q., May, 1903, Hole 8, 10 fm.

In all probability this species, like our own *Gammarellus* (*Amathilla*) *homari*, Fabr., inhabits deep water when full grown, only coming to shallow water to deposit its young, which are hatched in the brood pouch.

Mr. Hodgson writes: "This species occurred constantly in the traps, but in small numbers. I therefore soon ceased to preserve specimens, unless I could get them in good condition, and as their length of leg rendered this difficult, occasional specimens occur in the collection from most periods of the year. As far as I recollect, the adults with ova or young were only taken in the summer or autumn."

E. MICROPS. (Pl. 11, fig. 19.)

E. microps, A. O. Walker, Ann. and Mag. Nat. Hist. XVIII. (1906), p. 152.

W.Q., Hole 8, 10 fm., 10 May, 1903, one, length 25 mm., and 1 June, 1903, one, length 30 mm.; Penguin Rookery, Mount Erebus, Feb., 1904, one, length 48 mm., in bad condition.

Last segment of the mesosome and first two of the pleon carinate, with a postero-dorsal tooth. Third pleon segment with the carina rounded behind, hind margin rather convex, finely crenate in adult, the posterior angle a little produced and acute with a row of five or six intramarginal spines on the lower margin in front of it.

Urus with the first segment dorsally depressed.

Side plates small, the first subquadrate, not wider below; the next three subtriangular, the apex below; all rather deeply and irregularly crenate on the lower margin.

Head subequal to the first segment; ocular lobe not prominent, truncate. Eyes dark, almost round, diameter less than that of the first joint of the upper antennæ.

Upper antennæ reaching the base of the uropods; first joint about three-fourths of the length of the second, with a distal prominence on the lower margin terminated by a very sharply pointed tooth with a spine and a few setæ behind it; the second joint expands at the distal end, where there are two or three acute teeth; the third is subequal to the first of the flagellum. Secondary appendage as long as, and closely adherent to, the first joint of the flagellum.

Lower antennæ about half as long as the upper, the peduncles being subequal; second and third joints subequal.

Mandibles: First and second joints of the palp together longer than the mandible and four-fifths of the length of the third joint.

First maxillæ: Inner plate with five or six setæ.

Maxillipeds as in *E. longipes*, Stebbing.

First gnathopods: First joint robust; hinder angle of the third joint acute, as well as the carpal spur, densely setose; hand much longer than wide.

Second gnathopods rather longer than the first, the front margin of the second joint produced over the third.

First and second peræopods very slender, first joint about six times as long as wide and subequal to the next two; third joint twice as long as the fourth and rather longer than the fifth; all the joints with a few plumose setæ.

Remaining peræopods increasing in length backwards; the first joint has the hind margin rather concave, ending below in a sharp tooth, except in the third pair; the third joint is two-thirds of the length of the fourth, which is about three-fourths of the fifth; all the joints spinous and clothed with long plumose setæ. Dactylus slightly curved, the point blunt with a curved tooth near it.

Second uropods: Outer ramus about half as long and wide as the inner; this is a little longer than the peduncle, subequal in extent to the third uropods and spinous on both margins.

Third uropods: Rami subequal and similar, lanceolate, rather longer than the peduncle, with spines and plumose setæ on the inner margin.

Telson reaching beyond the end of the peduncle of the third uropods, with a small notch at the tip, the terminal divisions acute.

Recognisable by the relatively small eyes and slender hirsute legs. From its nearest ally, *E. holmii*, H. J. Hansen (Dijmphna Togtet Krebsdyr, p. 42, Pl. 22), it differs in the structure of the gnathopods.

FAM. CALLIOPIIDÆ, G. O. SARS.

ORADAREA LONGIMANA.*

Oradarea longimana, A. O. Walker.

Cape Adare, 9 Jan. 1902, 20 fm., nine young of various sizes, showing the gradual development of the dorsal teeth. Coulman Island, 13 Jan. 1902, 100 fm., three; W.Q., 19 Nov. 1902, Hut Point, one, length 20 mm.; 10 Jan. 1903, one; 26 Feb. 1903, one; 16 Mar. 1903, 35 fm., Hole 7, one; 30 Sept. 1903, Hole 12, one.

* Mr. Stebbing remarks on this species (Tierreich, Amphipoda Gammaridea, p. 727): "Strangely like *Leptamphopus novœ-zelandiœ*, G. M. Thomson." It differs, however, from this species as described in Trans. N. Z. Institute, Vol. II. p. 239, *Pherusa novœ-zelandœ*, in having only the first two pleon segments dorsally produced in *one* tooth, instead of the two posterior segments of the mesosome and two anterior of the pleon produced into *two* teeth; also in the upper antennæ having an appendage.

In the description of this species I omitted to mention that in both pairs of antennæ the second joint is produced distally on each side of the third joint in a subacute lobe or tooth.

Atyloides serraticauda.

Atyloides serraticauda, Stebbing.

Cape Adare, 9 Jan. 1902, 20 fm., one; and 24 Feb. 1904, in Laminaria roots, 13–20 fm., several. Cape Wadsworth, 15 Jan. 1902, 8–15 fms., one.

In addition to the difference noted in the description of the specimens taken by the 'Southern Cross' expedition at Cape Adare, viz., seven teeth instead of two on the hind margin of the third pleon segment, the following may also be mentioned:—

1. The eyes are hardly so large and vary much in depth of colour.

2. The first joint of the upper antennæ has a strong tooth at the distal end of the lower margin.

3. The side-plates of the first and second gnathopods have more teeth on the lower margins—about seven on the first and four * on the second. These, however, may be considered as merely local or age variations, and are not, in my opinion, sufficient to constitute a new species. The 'Challenger' specimens from "off Melbourne" measured $\frac{1}{4}$ inch or about 6 mm., the largest of the Cape Adare ('Southern Cross') being 15 mm.

Stebbingia gregaria.

Stebbingia gregaria, Pfeffer, Krebse v. Sud-Georgien Die Amphipoden, Jahrbuch d. wissenschaft. Anstalten Hamburg, V. (1888), p. 110.

W.Q., 29 Aug. 1902, Hole 12, two young specimens, length 6 mm.

These specimens differ in several respects from *Atyloides australis* (Miers) as described by Stebbing (Chall. Rep. p. 914). The basal joints of the flagellum of the upper antennæ are longer than wide, and there is no secondary appendage, both of which points agree with Pfeffer's description, but not with Stebbing's. The outer rami of the third uropods are shorter than the inner. The telson is divided only one-third of its length, with the tips of the divisions evenly rounded. In these last two points they differ from both Stebbing's and Pfeffer's descriptions, but the specimens are too young for any reliance to be placed on them. On the whole they agree better with Pfeffer's species than Stebbing's, of the identity of which I am doubtful (*see* Chall. Rep. pp. 913, 914, and 1654).

Pontogeneia magellanica. (Pl. 12, fig. 20.)

Atylopsis magellanica, Stebbing.
Pontogeneia magellanica, Stebbing.

W.Q., Hut Point, 13 Sept., 1902, one; 23 Nov., 1902, one, length, 12 mm. Tent Island, 3 Jan., 1904, three.

This is a similar instance to the last species of small variations which are insuffi-

* In a young specimen there are only two.

cient for the establishment of a new species. The hind margin of the third pleon segment above the upturned angle is almost straight; the whole lower margins of the first side-plates are serrate; the hand of the first gnathopods is considerably longer than the wrist, in proportion of six to four, and the divisions of the telson are smooth and rounded at the tips.

FAM. ATYLIDÆ, G. O. SARS.

ATYLUS WALKERI, Stebbing.

Atylus antarcticus, A. O. Walker.
Atylus walkeri, Stebbing.

W.Q., 31 Jan., 1902, Hut Point, 3 fm., several; 18 Mar., 1902, 10 fm., four; 28 Nov., 1902, one.

Length, 15 mm.

FAM. DEXAMINIDÆ, STEBBING.

POLYCHERIA ANTARCTICA.

Dexamine antarctica, Stebbing, Ann. and Mag. Nat. Hist. XV. (1875), p. 184.
Polycheria antarctica, Stebbing.

W.Q., 30 Sept., 1903, Hole 12, D net, six; length 6 mm.

This species was described by Mr. Stebbing, in 1875, from three small specimens found in a sponge dredged up by Sir J. Ross a few miles to the E. of the 'Discovery's' Winter Quarters. The specimens were not in good condition, or, probably, full-grown, so that the description is not as satisfactory as it might otherwise have been. Mr. Stebbing informs me that he has now united his *Tritæta Kergueleni* with this species. The present specimens agree with the description of *T. Kergueleni*, except in the following features: the side-plates of the first gnathopods are subquadrate, not produced in front; the posterior angle of the third pleon segment is produced, and acute; the margins of the telson are without spines; and the inner plate of the first maxillæ has two setæ.

Polycheria tenuipes, Haswell, *P. brevicornis*, Haswell, and *P. obtusa*, Thomson, have been referred to this species. The description and figure of the second gnathopod of the first of these, and the description of the same limb in the second, are quite unlike that of *P. antarctica* (Proc. Linn. Soc. N.S.W., Vol. IV., 1880, pp. 345–6, Pl. XXII., fig. 8g.).

MELPHIDIPPA MACRURA.

Melphidippa macrura, G. O. Sars.

Jan. 27, 1902, 300 fm., one; length to end of telson 25 mm.

The specimen which, with the exception of the loss of the third uropods, was in excellent preservation and was therefore not dissected, agrees with Sars' description

except that the middle postero-dorsal tooth on the first and second pleon segments is shorter, a character of little importance.

FAM. LILLJEBORGIIDÆ, Stebbing.

Lilljeborgia dubia.

Lilljeborgia dubia, Haswell.

W.Q., 29 Aug., 1902, and 28 Nov., 1902, two specimens, both young, the largest 12 mm.

FAM. PHOTIDÆ, G. O. Sars.

Haplocheira barbimana.

Haplocheira barbimana, G. M. Thomson.

Fairly abundant in W.Q., Oct. and Nov., 1902, especially at Hut Point; also at Flagon Point, 23 Jan., 1902, and W.Q., 30 Sept., 1903.

The appendage of the *upper antennæ*, which was broken in the 'Challenger' specimen, is three-jointed, the first wider than, but subequal in length to, the second; the third minute, reaching almost to the end of the second joint of the flagellum. The first urus segment has two small postero-dorsal teeth; these are sometimes difficult to see, and may have escaped Mr. Stebbing's notice, as they are not mentioned in his description. No sexual differences were observed. The females taken (except two on 1 Oct., 1902, which had young in their pouches) had generally parted with their ova.

Eurystheus longicornis. (Pl. 12, fig. 21.)

Gammaropsis longicornis, A. O. Walker, Ann. and Mag. Nat. Hist. XVIII. (1906), p. 153.

W.Q., 29 Jan., 1902, one female; W.Q., 20 Feb., 1902, several males and females; W.Q., 19 Mar., 1902, 10 fm., one female; W.Q., 22 Mar., 1902, 10 fm., one female.

Head almost as long as the first two segments; ocular lobe not much produced, angular.

Eyes round, red in the centre.

Third pleon segment dorsally depressed behind; posterior angle rectangular. First urus segment dorsally depressed in front. First four side-plates not as deep as the segments.

Female:—

Upper antennæ, reaching to the penultimate joint of the flagellum of the lower; the first joint more than twice as thick and less than half as long as the second, which is about one-fifth longer than the third; flagellum six-jointed, the first joint almost as long as the next two; appendage one-jointed, about one-third as long as the first joint of the flagellum.

Lower antennæ: First joint stout, about one-third of the second, which is shorter than the third; flagellum subequal to the second joint of the peduncle, five-jointed. Both pairs of antennæ are sparsely setose.

Mouth organs normal; the mandibular palp reaching beyond the first joints of the antennæ. The outer plates of the maxillipeds have spine-teeth only on the distal end of the inner margin.

First gnathopods: Side-plates oblong, rounded below, deeper than wide. First joint narrow, shorter than the fourth and fifth joints united; wrist subequal in length and width to the hand, hind margin convex, flattened near the middle; hind margin of the hand evenly convex, palm spinulose. *Dactylus* slender.

Second gnathopods: Side-plates as in the first pair. First joint widening distally; wrist subtriangular, half as long as the hand, the hind margin subangular and setose; hand with the palm subequal to the rest of the hind margin, minutely crenulate, slightly convex near the base of the dactylus, then concave to the palmar angle, which is rounded, with a spine on the side. Dactylus with two or three teeth near the point.

First and second peræopods as in *E. erythrophthalmus*, but less setose.

Last three pairs of peræopods increasing in length successively, the third pair as in *G. nana*, Sars; the fourth and fifth have the hind margin of the first joint convex above and almost straight below, with the posterior angle right. The last pair do not extend beyond the uropods.

First and second uropods: Outer rami shorter than the inner and subequal to the peduncles.

Third uropods: Peduncle twice as long as the styliform rami, of which the outer is slightly the shorter. All the uropods are sparsely spinous.

Telson not reaching to the middle of the peduncle of the third uropods, roof-shaped, with a small notch and spine at the distal end; when flattened and seen from above it appears to be triangular.

Length 6 mm.

Male:—

Upper antennæ not reaching the end of the peduncle of the lower, otherwise as in the female.

Lower antennæ almost as long as the whole animal.

Second gnathopods: First joint stouter than in the female, the front margin terminated by a blunt tooth; wrist very short, hind margin a little produced, subangular, setose; hand widening distally, front margin almost straight, hind margin rather longer than the palm, rather convex, with four fascicles of setæ terminating in a strong tooth forming the palmar angle; palm almost transverse, with a strong tooth behind the palmar one and an irregularly toothed and setose space between it and the base of the dactylus, the point of which reaches to the palmar angle, but is carried over the side of the hand.

Length 6 mm.

The most noticeable character of this species is (as the name implies), the great length of the lower antennæ, especially in the male.

FAM. SEBIDÆ. NOV.

Body rather slender, subdepressed; side-plates moderately deep.

Antennæ subequal, rather short.

Mandibles with a toothed cutting edge, molar tubercle obscure, palp rather small, three-jointed.

Maxillipeds with small inner and outer plates, palp well developed.

First gnathopods chelate in the females, chelate or subchelate in the males.

Second gnathopods longer than the first, perfectly chelate.

Third uropods uniramous.

Telson entire.

The genus *Seba* has been successively allotted to "the confines of the family *Leucothoidæ* (G. O. Sars)," Stebbing, p. 783; the *Lysianassidæ*, Della Valle, p. 773*; and the *Corophidæ*, Chevreux,† p. 111. As none of these positions is satisfactory, I have thought it better to establish a new family for it. As for the genus, it appears to me extremely doubtful whether the original species (*S. innominata*, A. Costa, of Sp. Bate, Brit. Mus. Cat., p. 159), as described by him, ever existed; it was repudiated by A. Costa. I propose, therefore, to call it *Seba*, Stebbing, 1875, with *Seba saundersi*, Stebbing, as the type.

SEBA ANTARCTICA. (Pl. 13, fig. 22.)

Seba antarctica, A. O. Walker, Ann. and Mag. Nat. Hist. XVIII. (1906), p. 154.

Common in sponges at Hut Point.

The females of this species agree in the smallest detail with the very careful and accurate description of *Seba saundersi*, Stebbing, in the 'Challenger' Report, and I have very little doubt that it is identical. For reasons given elsewhere,‡ however, it is impossible, in the absence of the description of the male from the same locality as *S. saundersi* (off Cape Virgins, Patagonia), to be certain of this.

For the description of the female I refer to that of *S. saundersi* above mentioned. The males appear to be dimorphic; the commoner form is only to be distinguished by the absence of the incubatory lamellæ. In one gathering, however (W.Q., 19 Mar., 1902, 10 fm.), two male specimens, measuring respectively 7 mm. and 5 mm., occurred; the length of females with ova and small males being 4·25 mm. In addition to their larger size, these were remarkable for having the meral joints of the last three pairs of peræopods greatly expanded behind, especially in the larger of the two.

* Fauna and Flora d. Golfes v. Neapel. Gammarini, p. 773.

† Amphipodes provenant des Campagnes de l'Hirondelle (1900), p. 111.

‡ Ann. and Mag. Nat. Hist. XVII. (1906), p. 569.

FAM. ISCHYROCERIDÆ, Stebbing.

Hemijassa.

Since the publication of *Jassa goniamera*, A. O. W., Canon A. M. Norman has pointed* out that the genus *Jassa*, Leach, was restricted by Bruzelius† to species with the upper antennæ "*flagello appendiculari destitutæ*," or, as is the case with his type species *J. capillata* (Rathke), having only a rudimentary appendage. As *J. goniamera* has a well-developed appendage, but differs from *Ischyrocerus*, Lillj. and *Bruzeliella*, Norman, in having no secondary teeth on the outer ramus of the third uropods, it becomes necessary to establish a new genus.

Hemijassa goniamera.

Jassa goniamera, A. O. Walker.

Coulman Island, 100 fm., 13 Jan., 1902, two specimens; W.Q., Flagon Point, 10–20 fm., 17 Jan., 1903, three; and 23 Jan., 1903, two.

FAM. COLOMASTIGIDÆ, Stebbing.

Colomastix pusilla.

Colomastix pusilla, Grube, Ausflug n. Triest, p. 137 (1861).

Oct. 1902, Hut Point, D net; sponges. Two males, one young, length 4·5 mm.

Differs from *C. brazieri*, Haswell, in having the first two pairs of peræopods subequal and similar to the remainder; also in the shape of the telson.

* Ann. and Mag. Nat. Hist. XVI. (1905), p. 83, note.

† Bidrag till Känn. Skand. Amphipodens Fauna, 1858.

EXPLANATION OF PLATES.

LIST OF ABBREVIATIONS USED WITH THE FIGURES.

c = cephalon, head.
ant[1], ant[2] = upper and lower antennæ.
M = mandible.
Mp = mandibular palp.
mx^1, mx^2 = 1st and 2nd maxillæ.
mxp = maxillipeds.
gn^1, gn^2 = 1st and 2nd gnathopods.
pp^{1-5} = 1st to 5th pairs of peræopods.
up^{1-3} = 1st to 3rd pairs of uropods.
T = telson.
pl = pleon ; pl^3 = 3rd pleon segment.
ur = urus and appendages.

PLATE 1.

Fig. 1.—*Hyperia macronyx.*

Fig. 2.—*Hyperoche luetkenides.*

PLATE 2.

Fig. 4.—*Waldeckia obesa,* Chevreux.

PLATE 3.

Fig. 5.—*Aristias antarcticus.*

Fig. 6.—*Orchomene goniops.*

PLATE 4.

Fig. 3.—*Hyperiopsis australis.*

Fig. 7.—*Orchomenella chelipes.*

PLATE 5.

Fig. 8.—*Podoprionides incerta.*

Fig. 9.—*Proboloides antarcticus.*

PLATE 6.

Fig. 10.—*Proboliella typica.*

Fig. 12.—*Oediceroides calmani.*

PLATE 7.

Fig. 11.—*Thaumatelson herdmani.*

PLATE 8.

Fig. 13.—*Epimeria inermis.*

Fig. 14.—*Epimeria macrodonta.*

PLATE 9.

Fig. 15.—*Epimeriella macronyx.*

Fig. 17.—*Iphimedia longipes.*

PLATE 10.

Fig. 16.—*Iphimedia echinata.*

PLATE 11.

Fig. 18.—*Iphimedia hodgsoni.*

Fig. 19.—*Eusirus microps.*

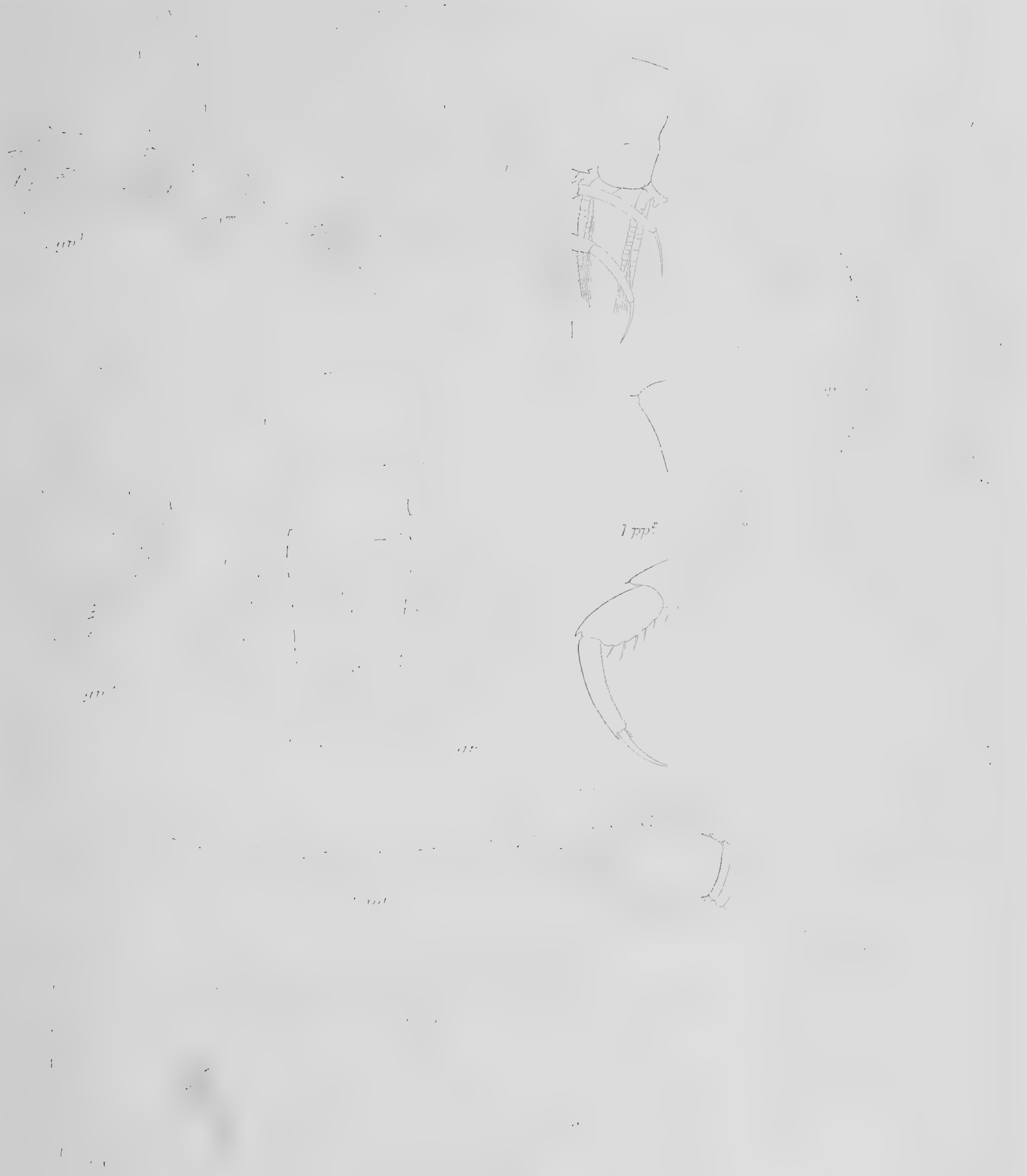
PLATE 12.

Fig. 20.—*Pontogeneia magellanica.*

Fig. 21.—*Eurystheus longicornis.*

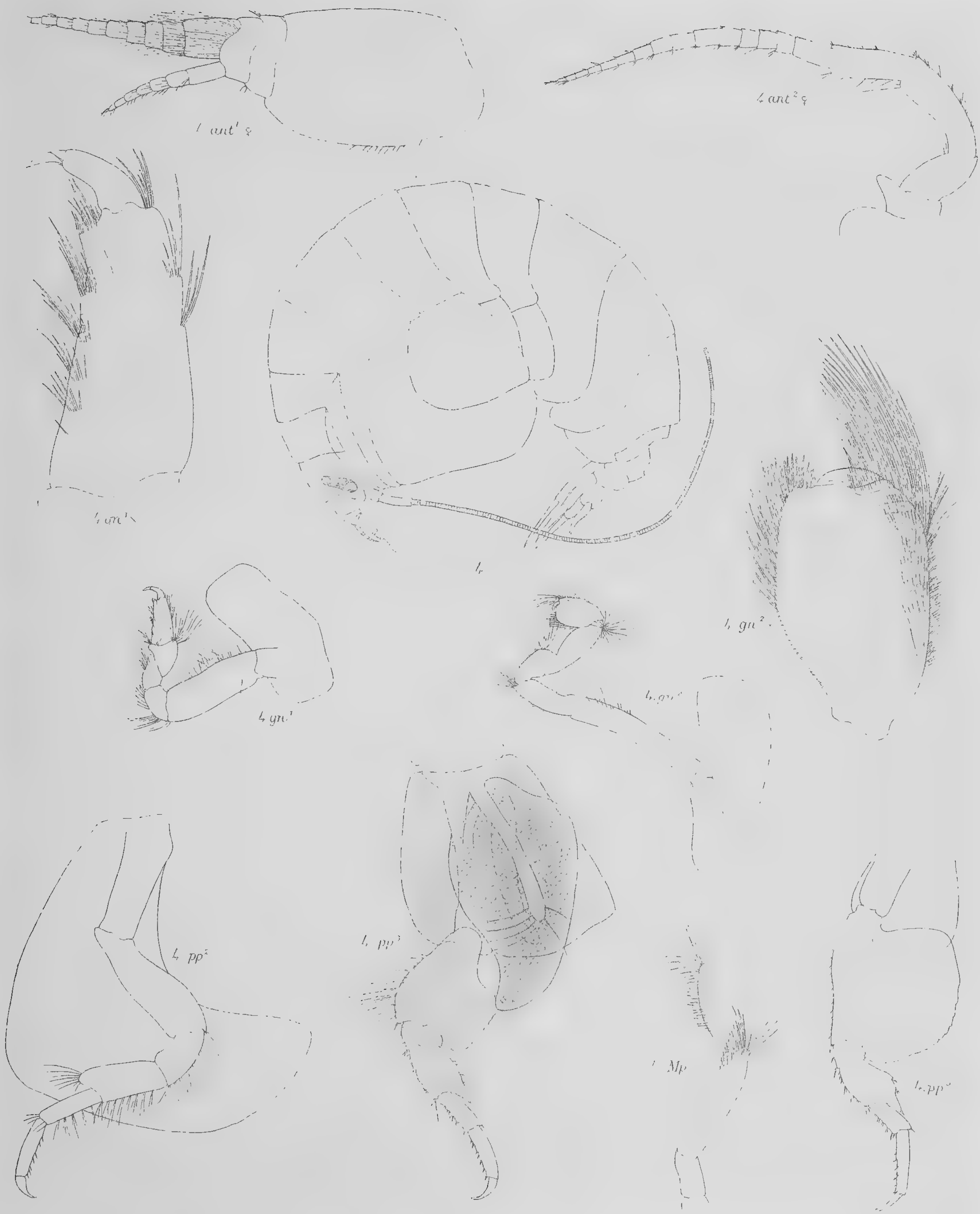
PLATE 13.

Fig. 22.—*Seba antarctica.* The figure of the whole animal is drawn from the larger of the two males mentioned on p. 37, while pp^5 ♂ is from the smaller of the two : note the difference in the third joint.



Huth del sc et imp

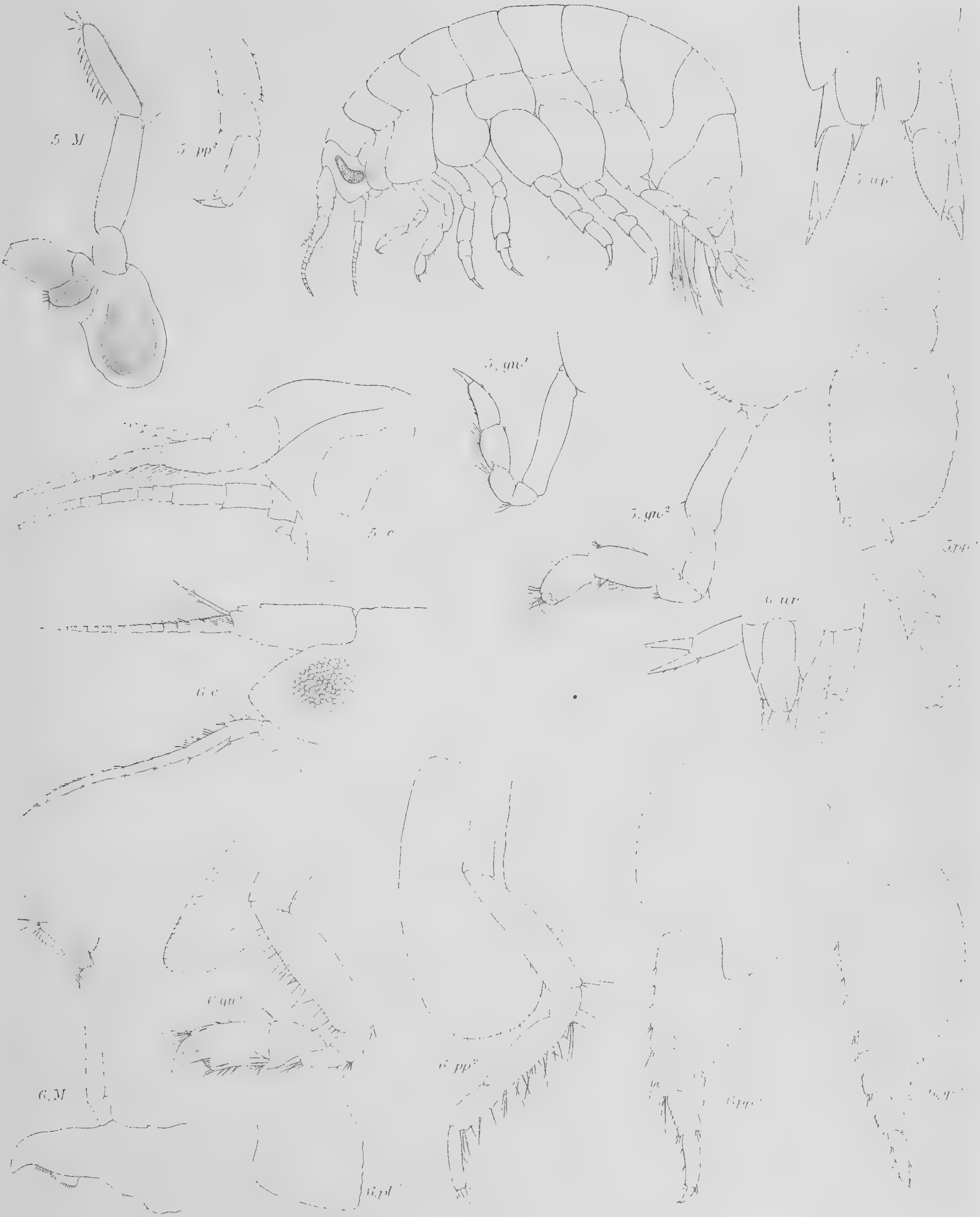
1. HYPERIA [illegible]   2. HYPEROCHE LUTKENIDES.



Antarctic (Discovery) Exp.

Huth del. sc. et imp

4. WALDECKIA OBESA.



Antarctic (Discovery) Exp.

Huth. del. sc et imp

5. ARISTIAS ANTARCTICUS. 6. ORCHOMENE GONIOPS.

Antarctic (Discovery) Exp.

Huth del sc et imp

3 HYPERIOPSIS AUSTRALIS 7 ORCHOMENELLA CH… [illegible]

Antarctic (Discovery) Exp.

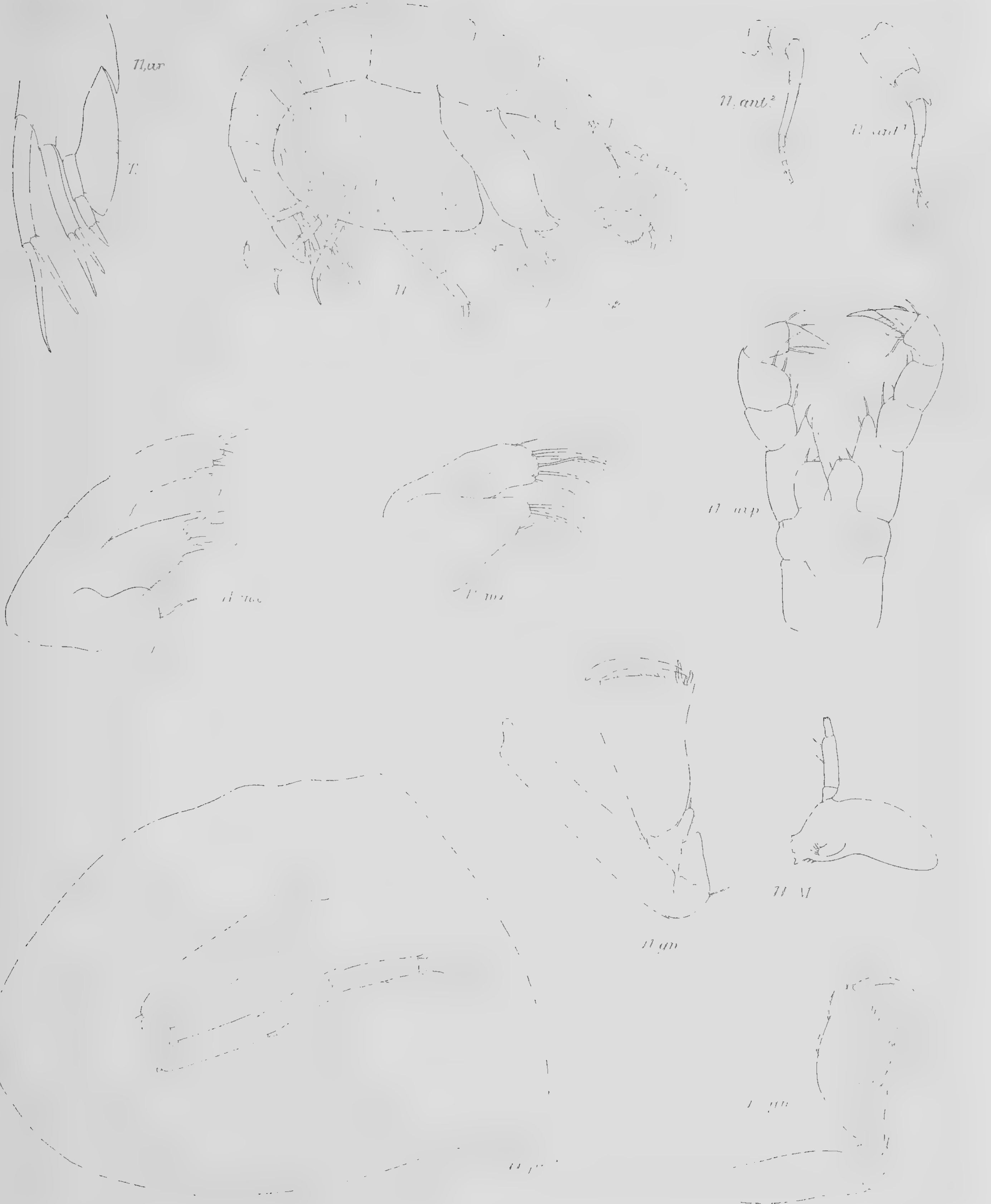
Huth del. sc et imp.

8. PODOPRIONIDES INCERTA. 9. PROBOLOIDES ANTARCTICUS.

Antarctic (Discovery) Exp.

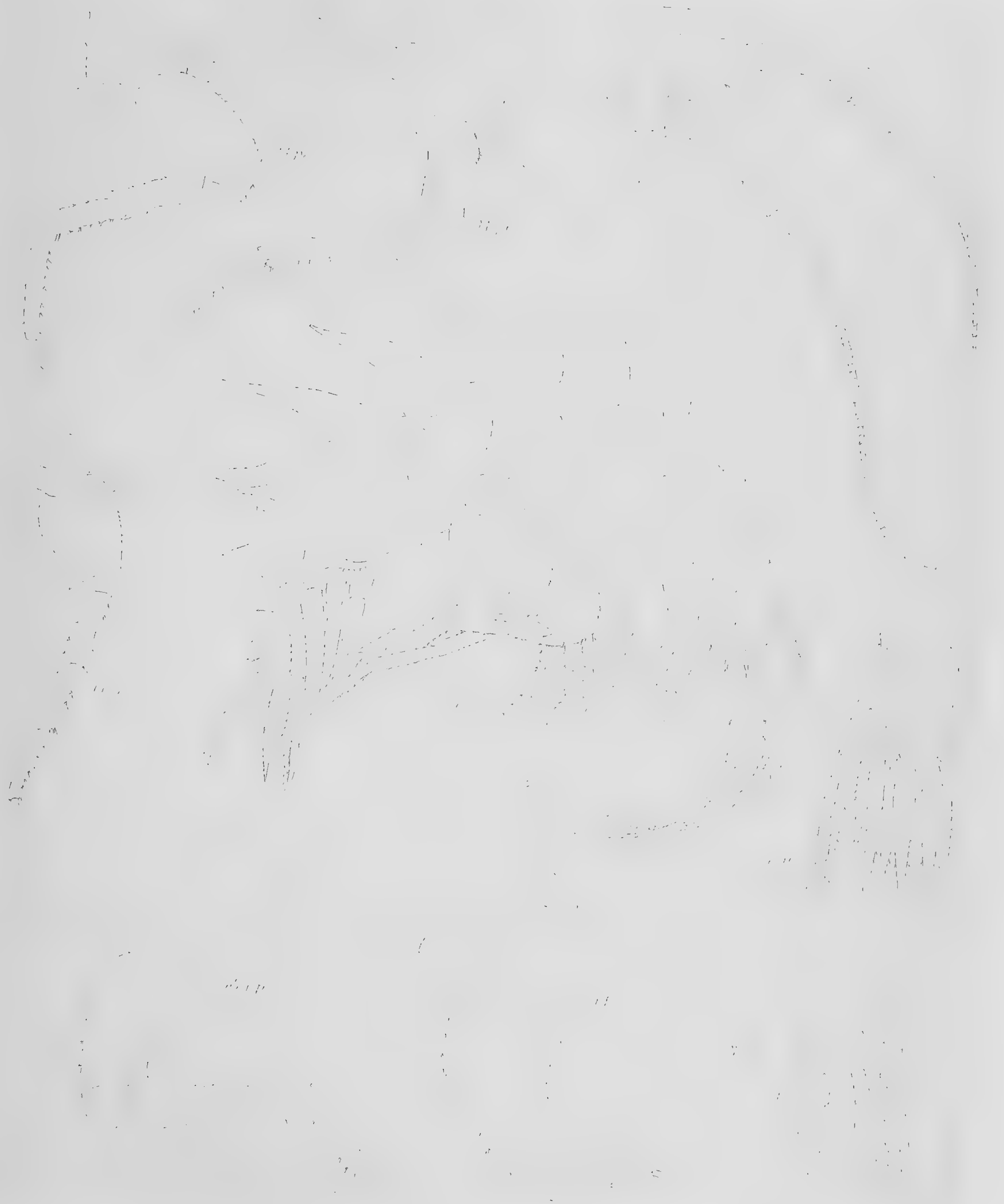
Huth del sc et imp

10. PROBOLIELLA TYPICA. 12. OEDICEROIDES CALMANI.



11. THAUMATELSON HERDMANI.

Huth del. sc et imp



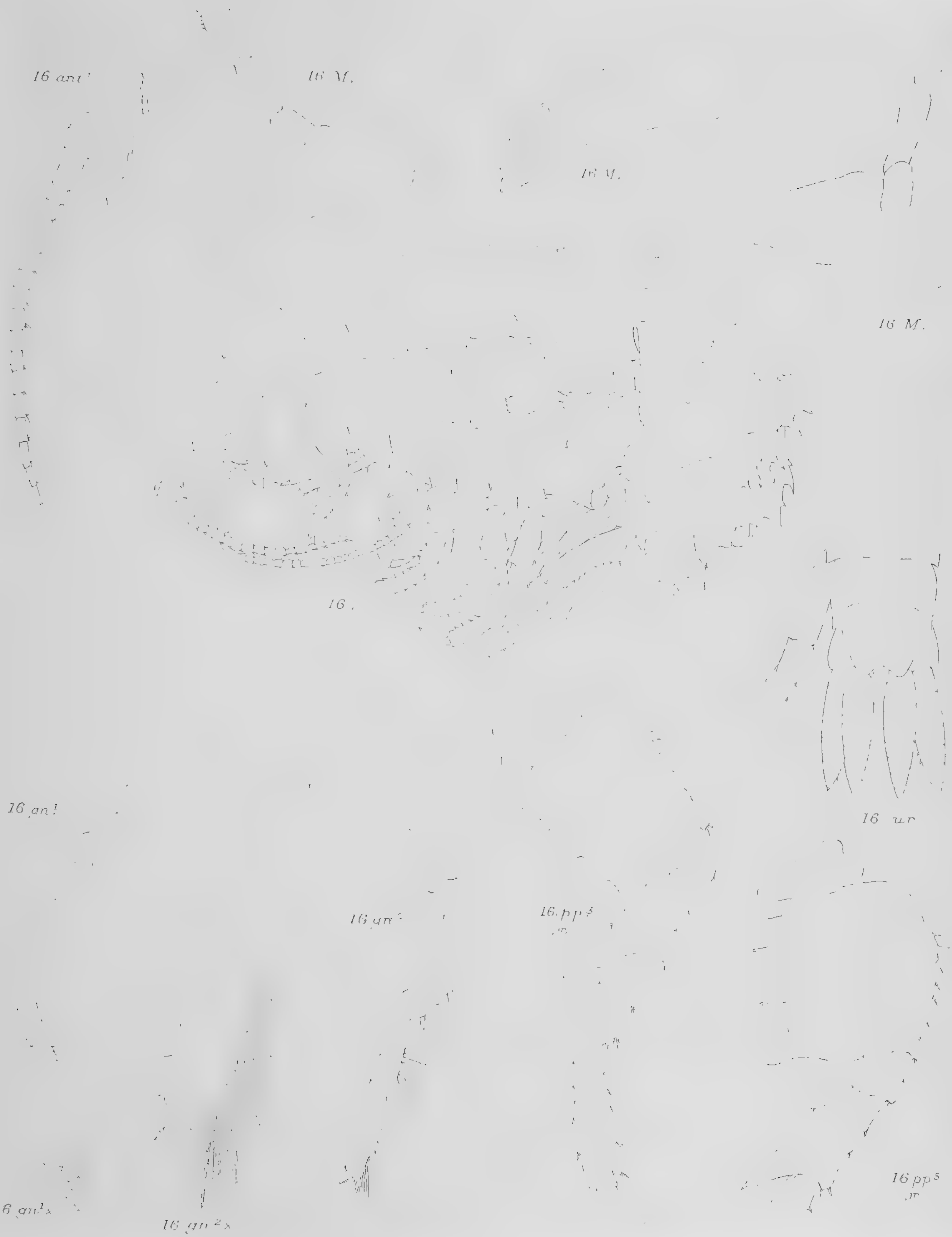
Antarctic (Discovery) Exp.

13. EPIMERIA INERMIS. 14. E. MACRODONTA.

Antarctic (Discovery) Exp.

Huth, del. sc et imp

15. EPIMERIELLA MACRONYX. 17. IPHIMEDIA LONGIPES



Antarctic (Discovery) Exp.

Huth, del sc. et imp.

16. IPHIMEDIA ECHINATA.

Antarctic (Discovery) Exp

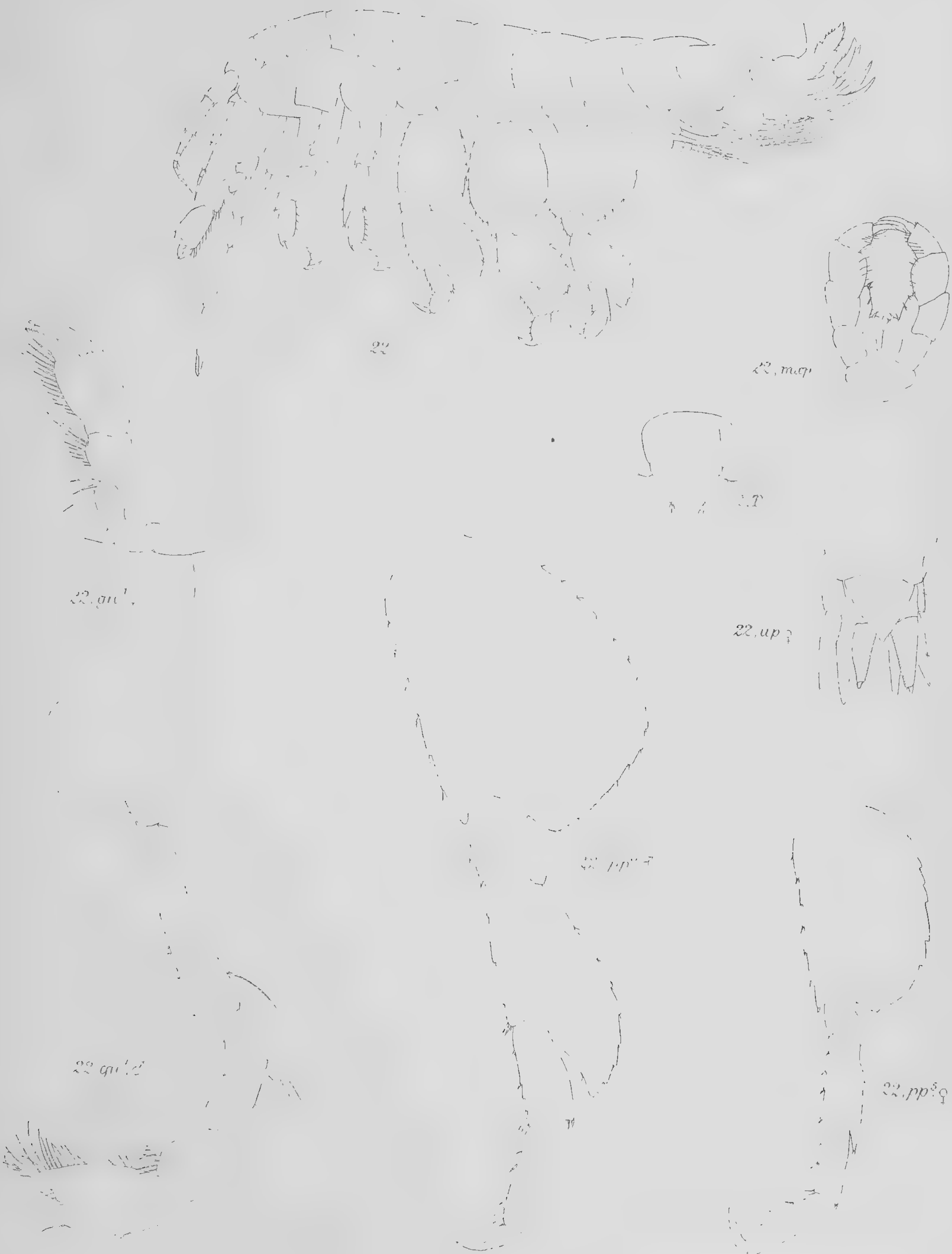
riuth del sc et imp

18 IPHIMEDIA HODGSONI. 19. EUSIRUS MICROPS.

Antarctic (Discovery) Exp

Huth del. sc. et imp

20. PONTOGENEIA MAGELLANICA. 21. EURYSTHEUS LONGICORNIS.



22. SEBA ANTARCTICA.

Huth del, sc, et imp

CRUSTACEA.

IV.—LEPTOSTRACA.

VON DR. JOH. THIELE, BERLIN.

ZAHLREICHE Leptostraken hat die 'Discovery'-Expedition erbeutet, sie sind mir zur Untersuchung übersandt worden. Es hat sich herausgestellt, dass alle Exemplare zu einer und derselben Art gehören, und zwar zu der Form, die ich zuerst aus der Magellanstrasse erhalten habe, weshalb ich sie *Nebalia longicornis magellanica* benannte (Die Leptostraken. Wissenschaftl. Ergebnisse der Deutschen Tiefsee-Expedition auf dem Dampfer 'Valdivia,' 1898–1899, v. 8, p. 13, 1904). Die Unterart *magellanica* unterscheidet sich von der typischen *Nebalia longicornis* durch einen starken, nach vorn gerichteten Sinneshöcker über dem Auge. Dieselbe Form hat dann die Deutsche Südpolar-Expedition in ihrer Winterstation am Gaussberge gesammelt (Die Deutsche Südpolar-Expedition 1901–1903, v. 9, Heft 1, 1905) und dieselbe ist es auch, welche die 'Discovery' mitgebracht hat.

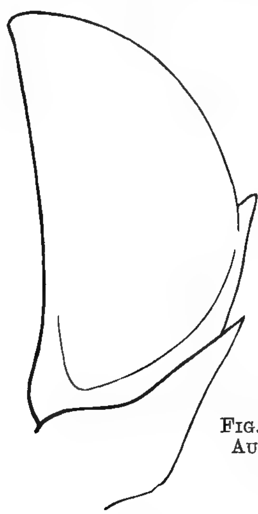


FIG. 2.—AUGE.

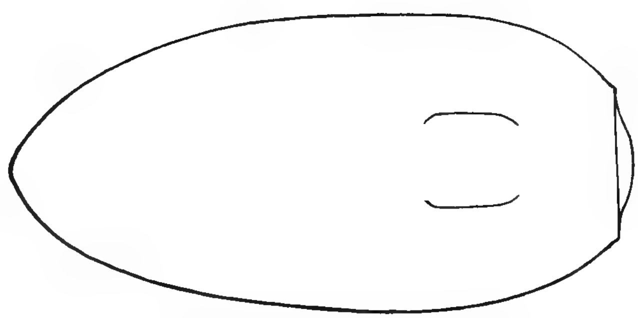


FIG. 1.—ROSTRUM, SEEN FROM BELOW.

Zu den Angaben, die ich in den beiden Publikationen über unsre Form gemacht habe, brauche ich nicht viel hinzuzufügen. Das Rostrum ist ziemlich lang, länger als ich es sonst bei *Nebalia longicornis*, die sich durch ein kürzeres Rostrum von *N. bipes* unterscheidet, gefunden habe (fig. 1); das Verhältnis der Länge zur Breite ist 2·13 : 1. Der Sinneshöcker am Auge ist mehr zugespitzt als gewöhnlich (fig. 2), das Auge nimmt den grössten Teil des Augenstiels ein. Die vordere Antenne zeigt das typische Verhalten der *Nebalia longicornis*, dass am 4$^{\text{te}}$ Gliede nur ein Dorn vorhanden ist, dem sich am Vorderrande 8 Borsten anschliessen.

Nach den 3 Fundorten, von denen *Nebalia longicornis magellanica* jetzt vorliegt: Magellanstrasse, Gaussberg und McMurdo-Bai, lässt sich schliessen, dass sie rings um den Südpol verbreitet ist.

Durch das Loch Nro. 4 (eine halbe Seemeile von Hut Point, 41 Faden = 75 m.) wurden zahlreiche Exemplare gefangen, ein einziges durch das Loch Nro. 6 ($1\frac{1}{2}$ Meile nordwestl v. Hut Point, 125 Faden = 230 m.).

CRUSTACEA.

V.—OSTRACODA.

By G. Stewardson Brady, M.D., LL.D., D.Sc., F.R.S.

(3 Plates.)

In the fifty-seven gatherings submitted to me there occurred only nine species of *Ostracoda*. Of these all except two appear to be hitherto undescribed. The paucity of species is accounted for by the fact that the nettings were made on a very limited number of small areas, many of them practically identical one with another, and differing only as to their various dates. The list of species is as follows :—

Conchœcia innominata, sp. n.
Paraconchœcia gracilis, Claus.
Pseudoconchœcia serrulata, Claus, var. *lævis*, var. nov.
Cypridina glacialis, sp. n.
Philomedes orbicularis, sp. n.
Philomedes assimilis, sp. n.
Philomedes antarctica, sp. n.
Xestoleberis reniformis, sp. n.
Linocheles vagans, g. and sp. n.

MYODOCOPA.

Conchœcia innominata.

(Plate II., figs. 7–14.)

Shell of the male (fig. 7) seen from the side, subquadrangular, height equal to about half the length and nearly equal throughout; rostral prominence acutely pointed, with an underlying sinus of moderate depth; anterior extremity rounded away below, and forming a curve continuous with the ventral margin, posterior abruptly truncated, its lower end boldly rounded off; dorsal margin nearly straight or only very slightly sinuous, obtusely angular at the posterior extremity, ventral rather boldly and evenly arcuate throughout its whole length.

The capitulum of the frontal tentacle (figs. 8 and 9) is club-shaped, acutely pointed and slightly hooked at the apex, and in the *male* bulbously dilated at the base, its inner margin more or less setose; stem of the antennule in the male (fig. 8) dilated,

almost pyriform ; the proximal long seta armed along its middle third with a double series of about twenty-five short, sharp prickles (fig. 8) ; in the female these are replaced by fine simple hairs (fig. 9). The secondary branch of the male antenna (fig. 11) bears a large terminal hook, the base of which is sharply bent at a right angle, and there is the usual fascicle of five long setæ ; in the female (fig. 10) the secondary branch has a simple terminal joint which bears four setæ of unequal length. Spines of the caudal laminæ slender and simple (fig. 14). The shell appears simply granular in structure until after removal of the delicate lining membrane, when it is seen to be very closely and finely striated in a curvilinear fashion ; there is a conspicuous group of gland-cells at the postero-ventral angle of the shell, and smaller gland-cells are continued in single file round the entire margin.

This species occurred plentifully in almost all the nettings taken in Winter Quarters. It was, indeed, by far the most abundant of all the *Ostracoda* taken during the Expedition. It has many points of resemblance to *Paraconchœcia inermis*, Claus, but cannot be identified with that species.

Paraconchœcia gracilis.

Paraconchœcia gracilis, Claus. Die Gattungen und Arten der Mediterranen und Atlantischen Halocypriden, p. 15.

Paraconchœcia gracilis, Claus. Die Halocypriden des Atlantischen Oceans und Mittelmeeres, p. 66, Pl. xii.

In a surface gathering from lat. 49° 40′ S., long. 172° 18′ 30″ E. were found a few examples of this species. Claus saw only two specimens, a male and a female, in material taken from a depth of 1500 metres in lat. 37° 45′ N., long. 13° 38′ W.

Pseudoconchœcia serrulata, var. *lævis*.

1874. *Conchœcia serrulata*, Claus. Die Familie der Halocypriden, p. 61, Pl. 1, figs. 2–7, 9–11, Pl. ii. figs. 12, 13, 17, 19.

1880. *Halocypris atlantica*, Brady. Report on the Ostracoda of the 'Challenger' Expedition, p. 164, Pl. xi., figs. 1–15, Pl. xii., figs. 11, 12.

1890. *Pseudoconchœcia serrulata*, Claus. Die Gattungen und Arten der Mediterranen und Atlantischen Halocypriden, p. 20.

1891. *Pseudoconchœcia serrulata*, Claus. Die Halocypriden des Atlantischen Oceans und Mittelmeeres, p. 72, Pl. xix., figs. 1–14, Pl. xxiii., figs. 1–13.

1895. *Pseudoconchœcia serrulata*, Brady. A supplementary report on the Crustaceans of the Group Myodocopa obtained during the 'Challenger' Expedition (Trans. Zool. Soc., London, Vol. XIV., Part iii., 1897), p. 96, Pl. xvii., figs. 22–24.

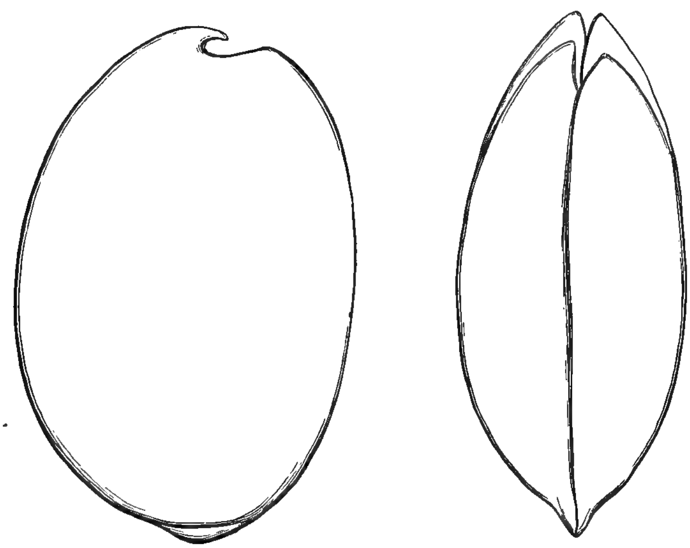
This is a widely distributed species, both in the Atlantic and Pacific Oceans (Claus). It occurred plentifully in many of the Plankton collections made during the voyage of the 'Challenger,' but I do not find any distinct record of its occurrence in higher latitudes than 35° 41′ N. and 56° 54′ S. It was found in very few of the

'Discovery' nettings, but in one of these it was plentiful—lat. 56° 54′ S., long. 170° 28′ E. The other stations in which it occurred less abundantly are lat. 49° 40′ S. long. 172° 18′ 30″ E. (surface); lat. 59° 19′ S., long. 120° 24′ 30″ E. (five fathoms); lat. 58° 49′ 45″ S., long. 154° 48′ W. (five fathoms); and in Winter Quarters, No. 8 hole (ten fathoms).

The 'Discovery' specimens differed in all cases from the type in being almost destitute of colour and striation of the shell, and in the absence of marginal serrulations, which are usually very distinct. But, apart from these peculiarities, I cannot find any characters to distinguish them from the type. I propose to give them the varietal name *lævis*.

Cypridina glacialis.

Shell, seen laterally, ovate, greatest height situated in the middle and equal to about two-thirds of the length; anterior extremity rounded off, beak short and acutely



Cypridina Glacialis.

pointed, not at all prominent, subjacent sinus small and shallow, posterior extremity slightly produced below the middle; dorsal margin boldly and evenly arcuate, ventral much flattened; seen from above the outline is elongated, ovate, more than twice as long as broad, widest in the middle, tapering gradually toward the anterior extremity, which is subacute, posterior extremity produced and mucronate. Substance of the shell thin but calcareous, surface smooth, destitute of markings or sculpture, colour yellowish. Length, 5 mm.

One specimen only—a female—was seen in a netting consisting mainly of *Philomedes assimilis*. Winter Quarters, 11th Nov., 1902; Hut Point. Its nearest allies seem to be *Cypridina gracilis*, Brady, and, perhaps, *C. luteola*, Dana, with neither of which, however, can it be certainly identified.

Philomedes orbicularis.

(Plate I., figs. 1–15.)

Shell of the *female* seen from the side almost circular, except in the region of the sinus at the ventral margin, length about one-fourth greater than the height (fig. 1); anterior extremity obtusely angulated above the rostrum, posterior broadly and evenly rounded, dorsal margin rather boldly arched throughout its whole length, ventral strongly arched from the deep subrostral sinus backwards. Seen from above (fig. 2) the outline is broadly ovate, rounded behind and submucronate in front, greatest width situated in the middle and equal to about two-thirds of the length. Surface of the shell smooth and densely clothed with a villous coating of very short hairs; margins of the rostrum and subjacent sinus fringed with stiff setæ (fig. 6). Shell of the *male* (fig. 3) somewhat elongated, height not greatly exceeding one-half of the length, rostrum and sinus less developed than in the female; posterior extremity obliquely subtruncate, slightly sinuated in the middle and rounded off ventrally; dorsal margin well arched, ventral forming a continuous flattened curve. In the young condition (figs. 4, 5), the shell of the *female* in lateral view has the postero ventral angle sharply produced and is mucronate when seen dorsally. The soft parts of the animal have the typical characters of the genus, but the antennal setæ (fig. 8) form two distinct series, the distal set being about twice as long as the proximal; the secondary branch of the female antenna (fig. 9) is two-jointed, the basal joint bearing a few short marginal setæ, the second joint four marginal setæ, one of which is longer than the rest and plumose, also a single lash-like apical seta. The secondary branch of the *male* antenna (fig. 10) is much like that of *P. brenda*, but less robust and its marginal setæ are shorter. The principal tooth of the second maxilla (figs. 12, 13) is very large and strong, somewhat hatchet-shaped, the two extremities produced into strong cutting lobes, with a third smaller lateral tooth—the appearance of the whole organ, however, varying very much according to the position in which it is seen. The other limbs present no features calling for special remark. Length, 2·5 mm.

P. orbicularis was found only in two gatherings (May 23, 1902 and June 15, 1902). It is in all respects very similar to the well-known European species *P. brenda* and may perhaps be fairly looked upon as a southern variation of that form. There is the same characteristic villous covering and the size is nearly the same, but there is a total absence, in the adult, of any posterior angulations of the shell, which is also considerably more tumid than that of the northern species. The rather well marked constriction of the anterior, and the broadly rounded character of the posterior extremity, when seen dorsally, are also noteworthy features. The form of the shell in *P. brenda* seems to be the same throughout life: at any rate the smallest specimens I have seen present characters exactly the same as those

of the adult. But one or two small specimens which occurred along with *P. orbicularis*, and which I at first took to be the young of that species, were very distinctly angulated posteriorly, and I now think that they belong probably to the following species *P. assimilis*, especially as they have not the villous covering of *P. orbicularis*.

Philomedes assimilis.

(Plate I., figs. 16–21. Plate II., figs. 1–6.)

Shell of the *female* seen from the side (Plate II., fig. 1) oblong, subcircular, height equal to two-thirds of the length, anterior extremity sharply angulated below at its junction with the wide truncated rostrum, posterior sloping steeply and forming a somewhat rounded, prominent angle at its ventral end; dorsal margin strongly arched, highest in the middle, ventral evenly but less strongly convex, terminating in front in a deep subrostral sinus and behind in an obtusely angular process. Seen from above (fig. 2) the outline is oblong, ovate, twice as long as broad, greatest width situated in the middle, anterior extremity obtusely pointed, posterior produced and mucronate, lateral margins evenly arcuate. The shell of the *male* (fig. 3) much longer in proportion to the height, rostrum and subrostral sinus much less pronounced, posterior extremity more narrowed and having a larger and more rounded ventral prominence; the squamous, marginal laminæ of the rostrum are marked with numerous hair-like striæ and are closely punctated (fig. 4). The limbs and appendages do not present any special specific characters, but the hairs at the base of the claws of the post-abdomen of the male are more than usually conspicuous (fig. 5). Length of the female, 1·8mm.

The stations at which *P. assimilis* was taken were all in Winter Quarters:—

September 30, 1903.—No. 12 hole, D. net 246.
Hut Point.—September 13, 1902, D. net.
Hut Point.—February 13, 1904, D. net 264.
10 Fathoms, March 19, 1902.
November 28, 1902, D. net.
May 23, 1902, and February 13, 1904.
12 Hole, D. net, September 8, 1903.

Philomedes antarctica.

(Plate III., figs. 1–10.)

Shell of the *female* seen from the side, broadly subovate (fig. 2), with a prominent beak, a deep subrostral sinus, and an obtusely prominent postero-ventral angle, greatest height situated in the middle, and equal to about two-thirds of the length; anterior extremity rather narrower than the posterior, sloping steeply from the dorsum to form the angularly prominent beak; posterior subtruncate, slightly sinuated, rounded off dorsally, but terminated ventrally by a rounded, backwardly produced prominence;

dorsal margin boldly and evenly rounded, ventral evenly convex but not so fully arched as the dorsal margin. Seen from above (fig. 3) the outline is ovate, scarcely twice as long as broad, widest in the middle, rounded off in front, strongly mucronate behind. The ventral border of the rostrum is produced into a thin lamina which is partly overlaid by long closely-set hairs, and the posterior border of the subrostral sinus is similarly fringed (fig. 4). Shell-surface closely and very finely punctated throughout, smooth, except on the ventral aspect, where it bears numerous scattered hairs. Just behind the rostral sinus there is a small patch of eleven or twelve subparallel striæ, and a short series of stiff hairs just within the ventral margin : a large black eye-spot just within the dorsal border at its anterior third.

The shell of the *male* (fig. 1) is larger and more elongated than that of the female, nearly twice as long as broad, with a less pronounced rostral sinus and a much narrower and more produced posterior extremity, the eye-spot small and situated near the centre.

Length of the male, 2·3 mm. ; of the female, 1·7 mm.

The setæ of the terminal fascicle of the antennule in the female are very short—not more than half the length of the limb ; the second (or third ?) seta of the antennæ is spinulose (fig. 8) in the female, the remaining setæ are simply ringed : the secondary branch of the antenna (fig. 6) is of the usual form, but has an indistinctly jointed appearance at the apex. Principal tooth of the second maxilla (female) (fig. 9) sharp and broadly triangular ; ungues of the caudal lamina (fig. 10) rather strongly pectinate in the female—but only faintly ciliated in the male. The eyes of the male (fig. 5) are pyriform, and deeply pigmented, the frontal tentacle rigid, dilated, and slightly pigmented at the base. Secondary branch of the antenna of the male large and strongly prehensile (fig. 7), the last joint bulbously dilated at the apex, basal joint bearing a strongly uncinate process. *P. antarctica* was found rather sparingly in four of the gatherings taken at " No. 4 hole " in a depth of five fathoms.

The shell was in all cases of a thin, membranaceous character, but I suspect that this may have arisen from the solvent action of the formalin preservative on the mineral matter.

PODOCOPA.

XESTOLEBERIS RENIFORMIS.

(Plate I., figs. 4, 5.)

Shell of the *male* seen from the side (fig. 4) subreniform, much narrower in front than behind, greatest height situated behind the middle and equal to half the length ; anterior extremity well rounded, narrow, posterior much wider, not very fully rounded, dorsal margin forming a continuous arch, highest behind the middle, sloping very gradually backwards and with a rather steep curve towards the front, ventral margin rather deeply sinuated in the middle. Seen from above, the outline is broadly ovate

(fig. 5), pointed in front, broadly rounded behind, the lateral margins very boldly arcuate, greatest width situated behind the middle and equal to two-thirds of the length. The surface of the shell is smooth, deep ochreous yellow in colour, with a conspicuous dark eye-spot within the dorsal margin near the front, just below and behind which there is a large irregularly shaped pellucid, sub-circular patch, and below this again a series of four oblong muscle spots, arranged in a transverse curve, and in front of these two smaller spots the long diameters of which lie in the opposite direction. The left valve is the larger of the two, overlapping the right both in front and behind. Length 0·65 mm. The shell of the *female* is somewhat more tumid, and seen from the side has no ventral sinuosity; it is also almost free from anterior depression, the two extremities being nearly equal in width.

Two specimens only of this small species were seen, a male and a female; the female, however, was only an empty shell and was quite colourless. The exact locality of the capture I do not know. The specimens were accidentally discovered in a flocculent diatomaceous deposit which settled from the liquid in which the larger Cypridinidæ had been preserved. The flexuous lateral contour of the male distinguishes this from any other species of *Xestoleberis* known to me.

LINOCHELES.*

Differing from the typical Cytheridæ in the greatly elongated and thread-like legs of the third pair, and in the abnormally formed copulatory plate of the male.

Linocheles vagans.

(Plate III., figs. 11–18.)

Shell closely similar in shape to *Xestoleberis*; seen laterally (fig. 11) that of the male is subreniform, greatest height situated behind the middle and equal to much more than half the length; anterior extremity narrow and obliquely rounded, posterior very wide and evenly rounded, dorsal margin boldly arched, steeply curved posteriorly, sloping with a gentle curve to the front, ventral margin sinuated in front of the middle; seen from above, the outline is elongated, ovate, widest in the middle (fig. 12), width rather less than half the length, narrowed and obtusely pointed in front, broader and rounded off behind. Shell-surface perfectly smooth; colour brown. Length, 0·64 mm.

Antennules six-jointed, very sparingly setiferous (fig. 13); antennæ short and stout, with short apical claws and a stout urticating seta which reaches to the apices of the claws (fig. 14). First and second pairs of legs (figs. 15, 16) armed with short and stout terminal claws; third pair much elongated (fig. 17), the last joint extremely slender and much longer than the united lengths of the two preceding joints; terminal

* λινον, a thread; χηλη, a claw.

dorsal margin boldly and evenly rounded, ventral evenly convex but not so fully arched as the dorsal margin. Seen from above (fig. 3) the outline is ovate, scarcely twice as long as broad, widest in the middle, rounded off in front, strongly mucronate behind. The ventral border of the rostrum is produced into a thin lamina which is partly overlaid by long closely-set hairs, and the posterior border of the subrostral sinus is similarly fringed (fig. 4). Shell-surface closely and very finely punctated throughout, smooth, except on the ventral aspect, where it bears numerous scattered hairs. Just behind the rostral sinus there is a small patch of eleven or twelve subparallel striæ, and a short series of stiff hairs just within the ventral margin : a large black eye-spot just within the dorsal border at its anterior third.

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Length of the male, 2·3 mm. ; of the female, 1·7 mm.

The setæ of the terminal fascicle of the antennule in the female are very short—not more than half the length of the limb ; the second (or third ?) seta of the antennæ is spinulose (fig. 8) in the female, the remaining setæ are simply ringed : the secondary branch of the antenna (fig. 6) is of the usual form, but has an indistinctly jointed appearance at the apex. Principal tooth of the second maxilla (female) (fig. 9) sharp and broadly triangular ; ungues of the caudal lamina (fig. 10) rather strongly pectinate in the female—but only faintly ciliated in the male. The eyes of the male (fig. 5) are pyriform, and deeply pigmented, the frontal tentacle rigid, dilated, and slightly pigmented at the base. Secondary branch of the antenna of the male large and strongly prehensile (fig. 7), the last joint bulbously dilated at the apex, basal joint bearing a strongly uncinate process. *P. antarctica* was found rather sparingly in four of the gatherings taken at " No. 4 hole " in a depth of five fathoms.

The shell was in all cases of a thin, membranaceous character, but I suspect that this may have arisen from the solvent action of the formalin preservative on the mineral matter.

PODOCOPA.

Xestoleberis reniformis.

(Plate I., figs. 4, 5.)

Shell of the *male* seen from the side (fig. 4) subreniform, much narrower in front than behind, greatest height situated behind the middle and equal to half the length ; anterior extremity well rounded, narrow, posterior much wider, not very fully rounded, dorsal margin forming a continuous arch, highest behind the middle, sloping very gradually backwards and with a rather steep curve towards the front, ventral margin rather deeply sinuated in the middle. Seen from above, the outline is broadly ovate

(fig. 5), pointed in front, broadly rounded behind, the lateral margins very boldly arcuate, greatest width situated behind the middle and equal to two-thirds of the length. The surface of the shell is smooth, deep ochreous yellow in colour, with a conspicuous dark eye-spot within the dorsal margin near the front, just below and behind which there is a large irregularly shaped pellucid, sub-circular patch, and below this again a series of four oblong muscle spots, arranged in a transverse curve, and in front of these two smaller spots the long diameters of which lie in the opposite direction. The left valve is the larger of the two, overlapping the right both in front and behind. Length 0·65 mm. The shell of the *female* is somewhat more tumid, and seen from the side has no ventral sinuosity; it is also almost free from anterior depression, the two extremities being nearly equal in width.

Two specimens only of this small species were seen, a male and a female; the female, however, was only an empty shell and was quite colourless. The exact locality of the capture I do not know. The specimens were accidentally discovered in a flocculent diatomaceous deposit which settled from the liquid in which the larger Cypridinidæ had been preserved. The flexuous lateral contour of the male distinguishes this from any other species of *Xestoleberis* known to me.

LINOCHELES.*

Differing from the typical Cytheridæ in the greatly elongated and thread-like legs of the third pair, and in the abnormally formed copulatory plate of the male.

Linocheles vagans.

(Plate III., figs. 11–18.)

Shell closely similar in shape to *Xestoleberis*; seen laterally (fig. 11) that of the male is subreniform, greatest height situated behind the middle and equal to much more than half the length; anterior extremity narrow and obliquely rounded, posterior very wide and evenly rounded, dorsal margin boldly arched, steeply curved posteriorly, sloping with a gentle curve to the front, ventral margin sinuated in front of the middle; seen from above, the outline is elongated, ovate, widest in the middle (fig. 12), width rather less than half the length, narrowed and obtusely pointed in front, broader and rounded off behind. Shell-surface perfectly smooth; colour brown. Length, 0·64 mm.

Antennules six-jointed, very sparingly setiferous (fig. 13); antennæ short and stout, with short apical claws and a stout urticating seta which reaches to the apices of the claws (fig. 14). First and second pairs of legs (figs. 15, 16) armed with short and stout terminal claws; third pair much elongated (fig. 17), the last joint extremely slender and much longer than the united lengths of the two preceding joints; terminal

* λινον, a thread; χηλη, a claw.

dorsal margin boldly and evenly rounded, ventral evenly convex but not so fully arched as the dorsal margin. Seen from above (fig. 3) the outline is ovate, scarcely twice as long as broad, widest in the middle, rounded off in front, strongly mucronate behind. The ventral border of the rostrum is produced into a thin lamina which is partly overlaid by long closely-set hairs, and the posterior border of the subrostral sinus is similarly fringed (fig. 4). Shell-surface closely and very finely punctated throughout, smooth, except on the ventral aspect, where it bears numerous scattered hairs. Just behind the rostral sinus there is a small patch of eleven or twelve subparallel striæ, and a short series of stiff hairs just within the ventral margin : a large black eye-spot just within the dorsal border at its anterior third.

The shell of the *male* (fig. 1) is larger and more elongated than that of the female, nearly twice as long as broad, with a less pronounced rostral sinus and a much narrower and more produced posterior extremity, the eye-spot small and situated near the centre.

Length of the male, 2·3 mm. ; of the female, 1·7 mm.

The setæ of the terminal fascicle of the antennule in the female are very short—not more than half the length of the limb ; the second (or third ?) seta of the antennæ is spinulose (fig. 8) in the female, the remaining setæ are simply ringed : the secondary branch of the antenna (fig. 6) is of the usual form, but has an indistinctly jointed appearance at the apex. Principal tooth of the second maxilla (female) (fig. 9) sharp and broadly triangular ; ungues of the caudal lamina (fig. 10) rather strongly pectinate in the female—but only faintly ciliated in the male. The eyes of the male (fig. 5) are pyriform, and deeply pigmented, the frontal tentacle rigid, dilated, and slightly pigmented at the base. Secondary branch of the antenna of the male large and strongly prehensile (fig. 7), the last joint bulbously dilated at the apex, basal joint bearing a strongly uncinate process. *P. antarctica* was found rather sparingly in four of the gatherings taken at "No. 4 hole" in a depth of five fathoms.

The shell was in all cases of a thin, membranaceous character, but I suspect that this may have arisen from the solvent action of the formalin preservative on the mineral matter.

PODOCOPA.

XESTOLEBERIS RENIFORMIS.

(Plate I., figs. 4, 5.)

Shell of the *male* seen from the side (fig. 4) subreniform, much narrower in front than behind, greatest height situated behind the middle and equal to half the length ; anterior extremity well rounded, narrow, posterior much wider, not very fully rounded, dorsal margin forming a continuous arch, highest behind the middle, sloping very gradually backwards and with a rather steep curve towards the front, ventral margin rather deeply sinuated in the middle. Seen from above, the outline is broadly ovate

(fig. 5), pointed in front, broadly rounded behind, the lateral margins very boldly arcuate, greatest width situated behind the middle and equal to two-thirds of the length. The surface of the shell is smooth, deep ochreous yellow in colour, with a conspicuous dark eye-spot within the dorsal margin near the front, just below and behind which there is a large irregularly shaped pellucid, sub-circular patch, and below this again a series of four oblong muscle spots, arranged in a transverse curve, and in front of these two smaller spots the long diameters of which lie in the opposite direction. The left valve is the larger of the two, overlapping the right both in front and behind. Length 0·65 mm. The shell of the *female* is somewhat more tumid, and seen from the side has no ventral sinuosity; it is also almost free from anterior depression, the two extremities being nearly equal in width.

Two specimens only of this small species were seen, a male and a female; the female, however, was only an empty shell and was quite colourless. The exact locality of the capture I do not know. The specimens were accidentally discovered in a flocculent diatomaceous deposit which settled from the liquid in which the larger Cypridinidæ had been preserved. The flexuous lateral contour of the male distinguishes this from any other species of *Xestoleberis* known to me.

LINOCHELES.*

Differing from the typical Cytheridæ in the greatly elongated and thread-like legs of the third pair, and in the abnormally formed copulatory plate of the male.

Linocheles vagans.

(Plate III., figs. 11–18.)

Shell closely similar in shape to *Xestoleberis*; seen laterally (fig. 11) that of the male is subreniform, greatest height situated behind the middle and equal to much more than half the length; anterior extremity narrow and obliquely rounded, posterior very wide and evenly rounded, dorsal margin boldly arched, steeply curved posteriorly, sloping with a gentle curve to the front, ventral margin sinuated in front of the middle; seen from above, the outline is elongated, ovate, widest in the middle (fig. 12), width rather less than half the length, narrowed and obtusely pointed in front, broader and rounded off behind. Shell-surface perfectly smooth; colour brown. Length, 0·64 mm.

Antennules six-jointed, very sparingly setiferous (fig. 13); antennæ short and stout, with short apical claws and a stout urticating seta which reaches to the apices of the claws (fig. 14). First and second pairs of legs (figs. 15, 16) armed with short and stout terminal claws; third pair much elongated (fig. 17), the last joint extremely slender and much longer than the united lengths of the two preceding joints; terminal

* λινον, a thread; χηλη, a claw.

claw very long, thread-like in its tenuity, nearly half as long as the entire limb; external copulative organ (fig. 18) elongated, divided into two portions, the distal part pear-shaped and attached by a narrow neck to the basal region.

Of this curious form only four specimens were found; all of them males. Three specimens from a surface netting in Lat. 49° 40′ S., Long. 172° 18·30′ E., and one from a netting in five fathoms, Lat. 58° 49·45′ S., Long. 154° 48′ W. It is difficult to account for the presence at the surface of an animal quite destitute of swimming organs. I am disposed to think that the real habitat is probably among floating weeds, and that the extremely long hinder limb may be useful in giving a grasp of delicate algæ or other vegetation.

Explanation of Plates.

PLATE I.

Philomedes orbicularis.

Fig. 1. Shell of female seen from left side × 22.
" 2. " " from above × 22.
" 3. " male seen from right side × 30.
" 6. Beak and sinus of female seen from side × 84.
" 7. Extremity of antennule of male × 84.
" 8. Antenna of female × 50.
" 9. Secondary branch of the same × 120.
" 10. " of male × 120.
" 11. Mandibular foot of female × 100.
(*a*) Process of basal joint × 300.
" 12. Principal tooth of second maxilla seen from side × 240.
" 13. " " " seen from front × 240.
" 14. End of vermiform foot × 84.
" 15. Post abdominal lamina × 84.

Xestoleberis reniformis.

Fig. 4. Shell of male seen from left side × 84.
" 5. " " from above × 84.

Philomedes assimilis.

Fig. 16. End of antennule of male × 84.
" 17. External branch of the antenna of male × 50.
" 18. Antenna of female × 84.
" 19. Mandibular foot of female × 100.
(*a*) One of the marginal setæ more highly magnified.
Figs. 20, 21. Principal tooth of second maxilla seen laterally and obliquely × 240.

PLATE II.

Philomedes assimilis.

Fig. 1. Shell of female seen from left side × 40.
" 2. " " seen from above × 40.
" 3. " male seen from left side × 40.
" 4. Beak and sinus of male × 84.
" 5. Post-abdominal lamina of male × 84.
" 6. " " female × 84.

Conchœcia innominata.

Fig. 7. Shell of male seen from left side × 22.
,, 8. Antennule and frontal tentacle of male × 84.
,, 9. ,, ,, ,, female × 84.
,, 10. Internal branch of antenna of female × 84.
,, 11. ,, ,, ,, male × 84.
,, 12. Chewing process of mandible × 240.
,, 13. Copulatory organ of male × 84.
,, 14. Post-abdominal lamina × 84.

PLATE III.

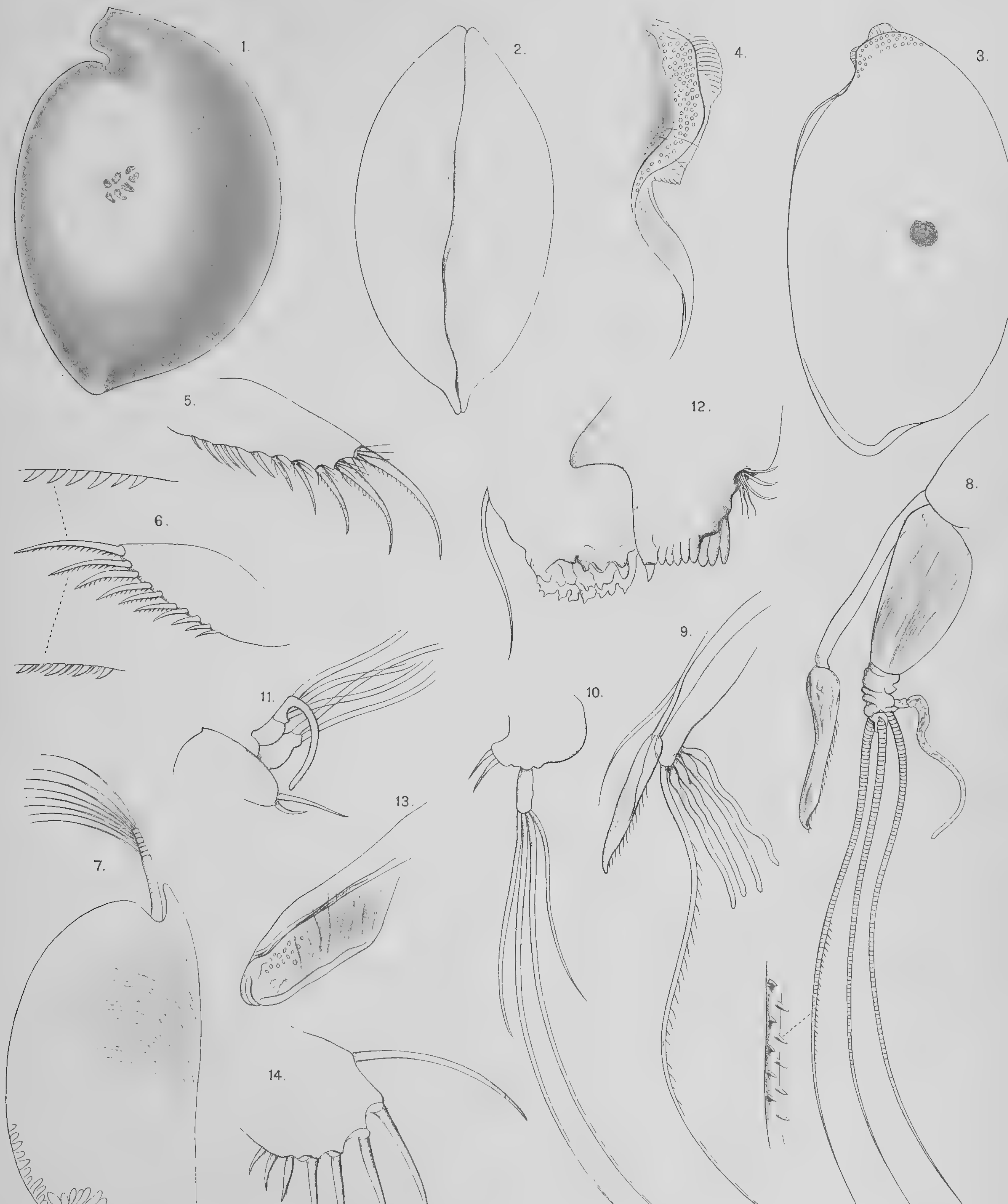
Philomedes antarctica.

Fig. 1. Shell of male seen from left side × 30.
,, 2. ,, female seen from right side × 30.
,, 3. ,, ,, ,, above × 30.
,, 4. Margin of shell of female with subrostral sinus × 84.
,, 5. Eyes and frontal tentacle of male × 55.
,, 6. Secondary branch of antenna of female × 100.
,, 7. ,, ,, ,, male × 100.
,, 8. Portion of second seta of antenna of female with marginal spines × 320.
,, 9. Tooth of second maxilla of female × 84.
,, 10. Caudal lamina of female × 84.

Linocheles vagans ♂.

Fig. 11. Outline of shell seen from left side × 84.
,, 12. ,, ,, ,, above × 84.
,, 13. Antennule × 240.
,, 14. Antenna (apical joints) × 240.
,, 15. Foot of first pair × 240.
,, 16. ,, second pair × 240.
,, 17. ,, third pair × 240.
,, 18. Copulatory organ × 240.

Antarctic (Discovery) Exp. Ostracoda pl. 1. G.S.B del. E. Wilson, Cambridge.



Ostracoda pl. 2.

G.S.B. del. E. Wilson, Cambridge.

Antarctic (Discovery) Exp.

Ostracoda pl.3.

C S B del. E. Wilson, Cambridge

CRUSTACEA.

VI.—CIRRHIPÈDES.

Par A. Gruvel,

Maître de Conférences de Zoologie (Université de Bordeaux).

(1 Plate.)

Les Cirrhipèdes du 'Discovery' qui m'avaient été envoyés dès le mois de Décembre, 1904, par le "British Museum," n'ont pu être étudiés qu'en Avril, 1906, à cause de travaux très importants et tout-à-fait différents que nous avions alors entrepris, en particulier de nos deux Missions pour l'étude des Pêcheries de la côte occidentale d'Afrique.

Bien que peu considérable par le nombre, cette collection du 'Discovery' contient une espèce d'Operculés intéressante, c'est un *Elminius rugosus* de Hutton, et deux espèces de *Scalpellum*, nouvelles pour la science : *Sc. Discoveryi* et *Sc. Bouvieri.*

Voici, du reste, la liste de ces espèces.

OPERCULATA.

Hexameridæ.

Genre *Balanus*, Da Costa.

Une seule espèce, représentée par des échantillons secs, dont les pièces operculaires ont entièrement disparu, mais qui est certainement le *Bal. psittacus*, Molina. Un individu d'assez grande taille est surtout bien caractérisé.

Tetrameridæ.

Genre *Elminius*, Leach.

Ce genre est représenté par une seule espèce également. Bien que Hutton n'aie pas publié de figure pour *Elminius rugosus*, la diagnose assez complète qu'il en a donné se rapporte si exactement à celle de l'espèce que nous avons eu à examiner que nous n'hésitons pas à l'identifier. Jusqu'ici cette espèce n'a été signalée qu'en Nouvelle-Zélande, sur les rochers du Bluff, par son auteur.

Nous croyons, donc, intéressant de donner quelques figures (fig. 1–3) se rapportant à cette espèce récente, très voisine, comme le dit Hutton, de l'*Elminius plicatus* de Gray.

* Trans. N. Zealand Inst., xi., 1878, p. 328.

PEDUNCULATA.

Polyaspidæ.

Les deux espèces qui représentent cette famille appartiennent au genre *Scalpellum* Leach, et sont, toutes les deux, nouvelles pour la science.

Nous avons eu plaisir à dédier l'une d'elles à M. le Professeur Bouvier, du Muséum de Paris, dont l'extrême obligeance à notre égard ne s'est jamais lassée, et qui a bien voulu présenter au public scientifique notre "Monographie des Cirrhipèdes."

Quant à l'autre, nous lui donnons le nom du navire qui a servi à la belle Expédition scientifique que l'on connait.

Scalpellum discoveryi (fig. 4–6).

Diagnose.—Capitulum avec 14 plaques, toutes imparfaitement calcifiées et très serrées les unes contre les autres. Carène régulièrement courbe, parfois redressée assez fortement avec l'umbo à l'apex et le bord dorsal régulièrement arrondi. Terga légèrement recourbés en arrière, avec le bord occluseur courbe. Rostre bien développé, triangulaire, avec les bords latéraux à peine recouverts par les bords occluseurs des rostro-latérales. Infra-latérales avec l'apex situé vers le milieu de la plaque, légèrement rétrécie en ce point. Pas de sous-rostre. Pas de sous-carène.

Pédoncule très développé, allant en se rétrécissant, régulièrement, de la région capitulaire à la base, recouvert d'écailles allongées transversalement, disposées en séries parallèles et obliques d'avant en arrière et de haut en bas. Ces écailles sont, du reste, régulièrement disposées et non imbriquées.

Limite entre le capitulum et le pédoncule, très nette.

Pas de pénis. Pas d'appendices terminaux ou filamenteux.

Dimensions : Longueur du capitulum : 9^{m} ; largeur, 5^{m}.
,, pédoncule : 14^{m} ; largeur, moy. 2^{m} 9.

Affinités.—Par la présence de 14 plaques imparfaitement calcifiées et d'un rostre triangulaire, cette espèce vient se placer nettement à côté de *Scalpellum intermedium*, Auriv.

Observations.—Dans les deux échantillons appartenant à cette forme et que contient la collection du 'Discovery,' la calcification des plaques est assez variable. Les deux figures que nous en donnons (figs. 4 et 5) suffiraient à elles seules à montrer les différences, parfois considérables, surtout dans les scuta et les terga.

En effet, tandis que dans le premier type (le plus calcifié, fig. 4), le bord basal des terga est droit, dans le second, il forme une concavité très accentuée. Il en est un peu de même pour le bord latéral des scuta. Dans le second exemplaire, les plaques carèno-latérales sont beaucoup plus allongées et plus irrégulières de forme que dans le premier.

Du reste, dans l'ensemble, le premier individu présente un capitulum moins long et plus large que le second.

Le pédoncule offre les mêmes caractères dans les deux cas, mais il est plus court dans le second échantillon, et, comme le capitulum est plus long, il en résulte que la longueur totale est, très sensiblement, la même.

Scalpellum bouvieri (figs. 7–9).

Diagnose.—Capitulum avec 14 plaques entièrement calcifiées et, le plus souvent, serrées les unes contre les autres. Umbo de la carène très net et situé à une petite distance de l'apex. Bord dorsal de la carène aplati, sans arètes latérales. Apex des terga légèrement recourbé en arrière, comme leur bord occluseur. Umbo des caréno-latérales situé vers le tiers de la hauteur, à partir de la base, et très légèrement saillant en arrière. Umbo des infra-latérales situé vers le milieu de la hauteur de la plaque, qui est légèrement rétrécie en ce point. Bord occluseur des rostro-latérales d'une longueur égale environ au tiers de celle du bord latéral, avec l'umbo légèrement saillant en avant.

Rostre trapézoïde, avec une carène médiane nette et les bords latéraux parfois en grande partie recouverts par les rostro-latérales.

Toutes les plaques capitulaires sont recouvertes par une cuticule transparente et glabre, partout très mince, sauf sur le bord occluseur des scuta et sur tout le bord dorsal des terga et de la carène.

Pédoncule de longueur à peu près égale à celle du capitulum, orné d'écailles allongées transversalement, en séries parallèles et à peu près régulières, rapprochées vers le capitulum et s'éloignant de plus en plus du côté de la base, mais jamais imbriquées.

Pas de pénis. Appendices filamenteux uniarticulés, à peine plus longs que le protopodite de la sixième paire de cirrhes et ornés de quelques rare soies.

Affinités.—Par son aspect extérieur d'ensemble et si on ne la considérait qu'un peu superficiellement, cette espèce pourrait être assez facilement confondue avec le *Scalpellum angustum* de Prof. G. O. Sars. Mais, examinée avec soin, on voit quelle s'en distingue par plusieurs caractères, dont les deux principaux sont : la présence d'un umbo très net à la carène qui manque chez *Sc. angustum*, où cette pièce est régulièrement courbe, et enfin par la présence d'une cuticule chitineuse qui, très mince dans cette dernière espèce, est beaucoup plus épaisse chez la nôtre, spécialement sur les terga et la carène.

Par la présence de l'umbo situé près de l'apex de la carène, et par l'ensemble de ses caractères, cette espèce vient nettement se placer à côté de *Sc. aduncum*, Auriv.

Observations.—Le *Scalpellum bouvieri* doit être très commun dans une partie des régions explorées par le 'Discovery,' car il a été retrouvé dans un grand nombre de dragages, en quantités très variables, du reste. Tous les individus que nous avons eu à examiner sont à peu près identiques à la forme moyenne que nous avons prise comme type. Presque tous sont fixés sur des Hydroïdes de diverses espèces et, parfois, en assez grand nombre, sur une même touffe.

Explication de la Planche.

Fig. 1.—Scutum d'*Elminius rugosus*, Hutton, vu du côté interne.
,, 2.—Tergum du même—face interne.
,, 3.—Scutum et tergum du même, encore unis.
,, 4.—*Scalpellum Discoveryi*, n. sp., 1ere forme, la mieux calcifiée.
,, 5.—Autre individu, moins calcifié, de la même espèce.
,, 6.—Rostre et bords occluseurs des rostro-latérales.
,, 7.—*Scalpellum Bouvieri*, n. sp., vu du côté droit.
,, 8.—Le même, vu de profil et du côté ventral.
,, 9. Rostre et bords occluseurs des rostro-latérales.

N.B.—Dans toutes les figures G = 5.

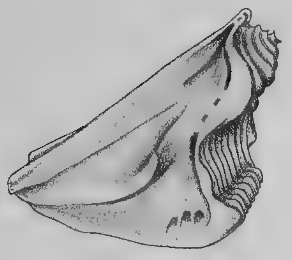


Fig. 1.


Fig. 2.

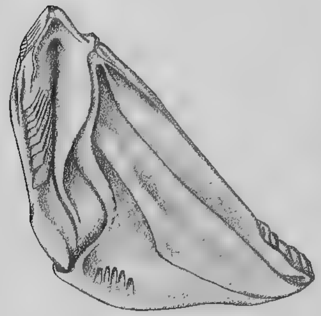


Fig. 3.


Fig. 8.


Fig. 9.

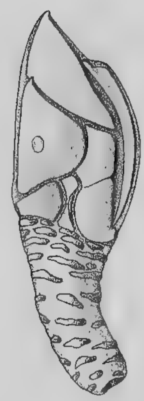


Fig. 7.

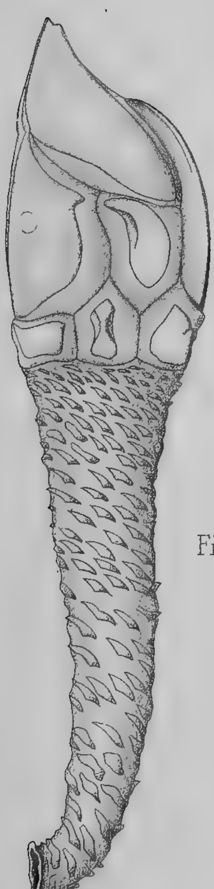


Fig. 4.


Fig. 6.

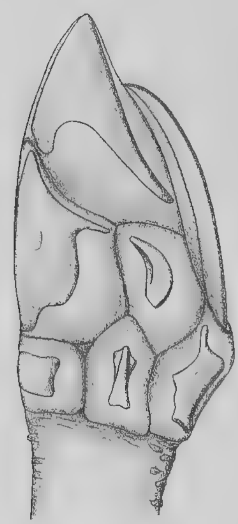


Fig. 5.

A. Gruvel, ad. nat., del.

A. Bénard lith.

Fig. 1 à 3. Elminius rugosus, Hutton. _ Fig. 4 à 6. Scalpellum discoveryi, A. G. _ Fig. 7 à 9. Sc. Bouvieri, A. G.

Imp. L. Lafontaine, Paris.

PYCNOGONIDA.

By T. V. Hodgson, F.L.S.

(10 Plates.)

The collection of Pycnogonids brought from the Antarctic by the 'Discovery' is a large one, including as it does no less than twenty-eight species, three of which have been assigned to as many new genera. Only one species can be regarded as of morphological importance, *Pentanymphon antarcticum*, which is now known to be abundant and to have a circumpolar distribution. It differs from the genus *Nymphon* only in the possession of an additional pair of legs. At first this was thought to be quite a novel feature in the morphology of the Pycnogonida, but the Scotch expedition brought another and much finer species from the South Orkneys. This proved to be identical with *Decolopoda australis*, described by Eights some seventy years ago, and taken at the South Shetlands. Eights' work was lost for a long time, and though it has been noticed recently by modern zoologists, the reception afforded it was extremely curious, involving as it did the point-blank refusal to accept the possibility of the existence of a Pycnogonid with more than the orthodox four pairs of legs. Mr. L. J. Cole (7), who apparently looked with more sympathy on the work of a fellow-countryman, was the first to appreciate this discovery properly. The genus *Leionymphon* was defined by Professor Möbius for a large but immature specimen taken by the 'Valdivia' in the vicinity of Bouvet Island. It has been found necessary to re-cast this genus; as now defined it contains no less than eight species, including two which had been assigned to the genus *Ammothea*, and another which Professor Möbius thought should be placed in the genus *Colossendeis*. No less than five species were taken by the 'Discovery,' and four of them are new. No true member of the genus *Ammothea* was seen, but two new species assigned to new genera, *Austrodecus* and *Austroraptus*, belong, as does the genus *Leionymphon*, to the family *Ammotheidæ* as defined by Professor G. O. Sars.

Austrodecus is perhaps a close relation of *Tanystylum*, Miers, and is a curious little form with a slender and elongated proboscis, like the snout of a weevil beetle, no chelifori, six jointed palps, and small ovigers. *Austroraptus* is remarkable for its spurred body and the length of its legs.

Rhynchothorax australis is another curious form; the only other species of the genus is found in the Mediterranean, but, notwithstanding certain differences, there does not seem to be any justification for giving the 'Discovery' species other than specific rank.

The remainder of the collection falls into well-known genera, and does not call for any special comment. A list is appended below of all the species now known from the Antarctic and sub-Antarctic regions, those taken by the 'Discovery' being marked with an asterisk. The numerous islands scattered about the southern seas have long been considered to pertain to the sub-Antarctic region, and for this reason I have made the mean annual isotherm of 45° F., as indicated by Sir John Murray in the concluding volume of the "Challenger Reports," its northern limit. This includes all that can reasonably be considered as belonging to this region, and coincides very closely with the opinion expressed by Professor P. Pelseneer in his Report on the *Mollusca* of the 'Belgica' Expedition. For the Antarctic proper the latitude 60° S. seems sufficient as it includes all the glaciated lands of Antarctica, and the shallower waters less than 1000fm., connected therewith.

	Antarctic.	Sub-Antarctic.
Pycnogonum magellanicum, Hoek		×
,, magnirostre, Möbius		×
* Phoxichilus australis	×	
Pallene dimorpha, Hoek		×
* Pseudopallene cornigera, Möbius	×	×
* ,, australis	×	
Pallenopsis patagonica, Hoek		×
* ,, pilosa, Hoek	×	×
,, fluminensis, Kröyer		×
* ,, glabra, Möbius	×	×
* ,, villosa	×	
* ,, hiemalis	×	
Anoplodactylus neglectus, Hoek		×
,, petiolatus, Kröyer		×
Nymphon gracile, Leach		×
,, gracilipes, Miers		×
,, brachyrhynchum, Hoek		×
,, hamatum, Hoek		×
,, fuscum, Hoek		×
,, meridionale, Hoek	×	
,, antarcticum, Pfeffer		×
* ,, hiemale	×	
* ,, lanare	×	
* ,, adareanum	×	
* ,, frigidum	×	
Chætonymphon brevicaudatum, Miers		×
* ,, villosum	×	
* ,, biarticulatum	×	
* ,, mendosum	×	
,, australe, Hodgson	×	
* ,, ,, var. austrinorum	×	
* Pentanymphon antarcticum	×	
Leionymphon striatum, Möbius		×
* ,, grande, Pfeffer	×	×
,, gibbosum, Möbius		×
* ,, minus	×	

	Antarctic.	Sub-Antarctic.
Leionymphon clausii, Pfeffer		×
* " australe	×	
* " glaciale	×	
* " spinosum	×	
Ammothea hoeki, Pfeffer		×
" wilsoni, Schimkewitsch		×
" communis, Bouvier	×	
" curculio, Bouvier	×	
Tanystylum styligerum, Miers		×
" dohrnii, Pfeffer		×
" chierchiæ, Schimkewitsch		×
* Austrodecus glaciale	×	
* Austroraptus polaris	×	
Ascorhynchus glaber, Hoek		×
* Rhynchothorax australis	×	
Colossendeis gigas, Hoek		×
" leptorhynchus, Hoek		×
" gigas leptorhynchus, Hoek		×
" megalonyx, Hoek		×
" robusta, Hoek		×
" gracilis, Hoek		×
* " australis	×	
* " glacialis	×	
* " frigida	×	
* " rugosa	×	
Decolopoda† australis, Eights	×	
" antarctica, Bouvier	×	

No less than seven expeditions have taken part in the recent "Siege of the South Pole," and the collections of Pycnogonids made by four of them still remain unpublished. This being the case, it is scarcely desirable to enter into a discussion on the geographical distribution of these animals. It may, however, be stated that the head-quarters of these animals appears to be in southern seas. Professor Möbius (22) has compiled a list of the known Arctic and sub-Arctic species, which number forty-two. In the same work, for comparison, he has added a list of all the species taken beyond 30° South latitude. Only thirty-one species are included in this large area, and the genus *Tanystylum* is the only one occurring in the south which does not occur in the north. I have reduced the Southern or Antarctic area to what I consider more reasonable dimensions, and the 'Discovery' collection, with its predecessors, raises the total to sixty-three species. Among these species there are five new genera; four of these are, as far as is yet known, confined exclusively to the Antarctic region, the other extends well into the sub-Antarctic region. The "Bipolarity Theory" is only affected by a single species, *Colossendeis australis.* Of all the numerous species of this genus, *C. proboscidea*, from the north, and *C. australis*, from the south, stand apart from all the rest on account of their bodily form, and there can be no question that they are much more nearly related to each other than

† [As Eights said his species had "five perfect pairs" of legs he doubtless meant to write *Decaholopoda.*—Ed.]

to any other members of the genus. The two species, as species are recognised now-a-days, are perfectly distinct, but it is a fair question to ask how is their present position at the opposite ends of the earth to be accounted for?

As to the terms employed in the following work, some words of explanation are necessary.

Naturalists have not always used the same terminology, and Mr. L. J. Cole (6) has recently tabulated the essential variations. As, however, the terms used by any one naturalist have not been fully adopted, and others have been introduced, a complete account of the terminology used here is given.

The entire Body of a Pycnogonid is divisible into three regions—the proboscis, trunk, and abdomen—and this without regard to any of the appendages. Where the body only is alluded to, it is to be understood that both the trunk and abdomen are taken together. Measurements are taken dorsally, unless otherwise specified, except in the case of the appendages, which are generally measured from the side, and the length of the trunk is usually taken to the base of the abdomen; in exceptional cases, where the abdomen is vertical or very short, the trunk may be measured to the extremity of the posterior lateral processes, but this is so stated. Its width is always across the longest of the lateral processes.

The Cephalon is regarded as that portion of the trunk which lies in front of the first pair of lateral processes, and the so-called neck is the narrowest part, sometimes elongated, between those processes and the more expanded distal portion.

Segmentation is not regarded as perfect or complete unless the four segments of the trunk and the abdomen are distinctly articulated.

The first appendage of the trunk is the Cheliforus, also commonly known as the mandible. A considerable amount of confusion has been, and is still likely to be, caused by the fact that the chela has most frequently been regarded as a single joint. Obviously it consists morphologically of two joints, and in order to avoid any misapprehension as to the number of joints, this appendage has been described as chelate, or otherwise, and the scape, a name given by Professor G. O. Sars to the shaft supporting the chela, has been recorded as one- or two-jointed, as the case might be. This method of dealing with the limb is suggested in order to avoid confusion as to the number of joints it possesses.

The second appendage is the Palp.

The third appendage is the Oviger. This convenient name was given by Mr. L. J. Cole to replace the more cumbrous term "ovigerous," or "false leg." In these two appendages the various joints are numbered from the base, and not named.

The remaining four or five pairs of appendages are Legs pure and simple; with the use of the word "oviger," the qualification "ambulatory" or "walking leg" becomes quite unnecessary. The terms used for the individual joints are those adopted by Professor G. O. Sars, viz., first, second and third coxa, femur, first and second tibia, tarsus and propodus.

A projection beyond the insertion of the terminal claw, which occurs in some species, is called the Heel, a term introduced by Mr. L. J. Cole. Two other expressions have been adopted for purposes of convenience. In very many species, not to say genera, there occurs a thickening of the skin on the sides of the legs, not infrequently also on some of the other appendages; this takes the form of a narrow and conspicuous line, usually of a reddish colour, and so it has been termed the "lateral line." The other feature concerns the setæ. At the extremity of most of the joints there is a fringe of more or less specialised setæ, sometimes surrounding the joint, but frequently more conspicuous on the dorsal or the ventral aspect. This has been termed the distal fringe, a name which does not appear to be inappropriate.

Precise measurements are invariably necessary with regard to the legs. One leg is generally considered to be sufficient for this purpose, and as Dr. P. P. C. Hoek adopted the third leg of the right side for this purpose wherever possible, the same limb has been used here.

PHOXICHILUS.

This genus is readily distinguished by its slender form and the complete absence of chelifori and palps. The ovigers too only occur in the male, and are seven-jointed. Among other characters may be mentioned the presence of a "collar" between the cephalon and the proboscis. This, however, is deficient in the species described below.

Numerous species have been assigned to this genus, but the difficulties of species discrimination is increased by the absence of two of the normal number of appendages, and necessitates some modification of the generic characters. No less than six species have been described from European seas, but their specific distinctness is open to question. Three others have been found in distant seas, and a fourth now described is from the extreme south.

Phoxichilus australis.

(Plate I., fig. 1.)

Specific characters :—

Body slender, with lateral processes very widely separated and with the long legs completely covered with very minute stiff setæ.

Tarsus with a very prominent ventral spine, and three to five proximally on the propodus, which projects distinctly beyond the insertion of the terminal claw and auxiliaries.

No distinct collar anteriorly to cephalon.

Body slender, with the lateral processes long and very widely separated; perfectly smooth to unassisted vision, but with a 1-in. objective extremely minute spines can be detected; segmentation very prominent and immediately behind each pair of lateral processes.

The Cephalon is small, but stouter than the trunk, truncated anteriorly with the angles bevelled off. No collar exists as such, but a band of thin chitinous skin, characteristic of an articulation, occurs between the cephalon and the base of the proboscis.

The Ocular tubercle lies almost in the middle of the cephalon, but scarcely clear of the first pair of lateral processes. It is very stout, of no great elevation, terminating in a strong cone above the four eyes.

The Abdomen is small, cylindrical, terminating in a cone, and directed almost vertically upwards. It is not articulated to the trunk.

The length of the trunk is 5mm. (to extremity of posterior lateral processes) and its extreme width is 3mm.

The Proboscis is long and slender, scarcely 4mm. in length, flexibly united to the trunk. It is cylindrical, but very slightly swollen before the middle and equally slightly narrowed before its rounded extremity. The mouth is inconspicuous, but of normal size. The proboscis is covered, more especially distally, with extremely minute spines.

The Legs are long and slender, attaining a length of 30mm. The first coxa is the smallest, and the second is a trifle longer than the first and third together; the proportions of the three following joints are as 8 : 6·75 : 8·5; the tarsus is very small, and the propodus, which is curved, is about a quarter the length of the femur. The entire limb, as the trunk, is completely clothed with extremely minute stiff setæ, which for the most part are only visible with a powerful lens. On the tibia they are, however, rather more conspicuous, besides being most abundant. The larger or ventral surface of the tarsus is covered with short spines, but one distal one is extremely large and prominent. Dorsally the propodus is covered with the minute stiff setæ, ventrally there are at the proximal end of the joint three to five very large spines, the remainder of that surface being occupied by a band of much smaller though still conspicuous spines of rather irregular size. A prominent heel projects over the insertion of a powerful terminal claw and its two auxiliaries, these latter being about half its length, but much more slender. The second coxa bears dorsally, just beyond the middle of its length, a tubercular enlargement, which is perforated by a glandular opening.

The genital apertures occur on a transverse ridge at the extremity of the second coxa of every leg. Ventrally, in the angle formed by the first pair of lateral processes and the trunk, there is a very small but distinct process on each side, exactly in the position where the oviger should be.

This type specimen is a female, and was taken off Flagon Point in Winter Quarters in 5–20 fm., on very rough ground.

Two other females were taken, one slightly larger than the type came from 125 fm., on a bottom composed of small stones and organic débris; the other is much smaller, but the precise point at which it was captured in Winter Quarters remains uncertain. A fourth specimen is a male, and is to a considerable extent overgrown with polyzoa. This specimen was taken at the same time and place as the type. It is sexually mature, and the genital apertures occur on the three posterior legs only. The ovigers are well-developed, but unfortunately only four basal joints remain on either side. They arise in the angle formed by the first lateral process and the trunk,

but not on a body process ; the first joint is small, the second is a little longer, the two following which are longer still, the fourth is largest. The appendage bears a moderate number of minute setæ.

I have been unable to distinguish the cement glands on the femur as described and figured by Professor G. H. Carpenter for other species. (4 and 5.)

PSEUDOPALLENE.

This genus, established by Mr. E. B. Wilson in 1878, has been more completely defined in accordance with modern requirements by Professor G. O. Sars (25). It is very closely allied to *Cordylochele* (G. O. Sars), but the special features which distinguish it from that genus are (*a*) the crown of setæ at the distal extremity of the proboscis ; (*b*) the presence of spines on the body and legs.

Two species are now described, one of which I regard for the present as identical with those derived from the 'Valdivia' and 'Français' Expeditions.

Pseudopallene cornigera.

(Plate I., fig. 3.)

Pseudopallene cornigera, Möbius (23). p. 186.
Cordylochele turqueti (?), Bouvier (2). p. 297.

Specific characters :—

Body with long lateral processes not very widely separated, these armed dorsally with a stout spur. A pair of similar spurs on the cephalon.

Legs with longitudinal rows of setæ set in small tubercular bases. Propodus well covered with setæ and a proximal group ventrally of half-a-dozen spines.

Oviger ten-jointed. Denticulate spines with three strong teeth at the base.

Body rather robust, with long lateral processes not very widely separated. The length of these processes is increased by a very prominent spur which occurs dorsally on each.

A very conspicuous spur occurs on the antero-lateral border of the Cephalon. This is rather long, with a definitely constricted neck, and widens considerably into two lobes bearing the chelifori, and between which the proboscis arises.

The Ocular tubercle is short and stout, rounded above, and bears four well-developed eyes. It lies between the first pair of lateral processes and the neck.

The Abdomen is of normal proportions, gently tapering, and not articulated to the trunk. It is directed upwards, but does not extend beyond the posterior lateral processes, and bears a few minute setæ. The segmentation is distinct.

The length of the body is 6mm., and its extreme width is barely 5mm.

The Proboscis is ventral in origin, rising apparently from a pocket between the chelifori, directed obliquely downwards. It is a little longer than the cephalic segment gently tapering to a blunt point, the small triangular mouth being surrounded by a tuft of small bristles.

The Chelifori are well-developed; the scape is single-jointed, about two-thirds the length of the proboscis, enlarged at its distal extremity, and carries a few minute setæ. The chelæ are massive, curved almost to a right angle near their bases, and thickly covered with minute setæ. The fingers are short and massive, the immovable one bears two tubercles distally, but the movable one has none.

Palps are not present, but on either side of the cephalon ventrally, and just outside the chelifori, there is a small mark, an indication of where they should be. The antero-ventral margin of the cephalon is a slightly curved line.

The Oviger (fig. 3) is ten-jointed, and is built on much the same lines as in the genus *Nymphon.* It arises on a very small body-process between the neck and the first lateral process. The first three joints are small and progressively increase in length, the third being slightly curved and having a very oblique distal termination. The fourth joint is rather longer than the three preceding ones together; it is stout, curved, and like them, scantily supplied with small setæ. The fifth joint is very long and slender; owing to the curves it is difficult to measure precisely, but it appears to be as long as or longer than the preceding four joints. Its distal half bears a bunch of about forty large eggs, and is terminated by a short lobe. The sixth joint is quite short; the seventh and eighth are longer and sub-equal; the ninth and tenth progressively shorten, but only by a very little, the last one being slightly curved. The terminal claw is worn down to a stump, but appears to have been slender. The four terminal joints each bear a row of denticulate spines and a few small setæ dorsally. The spines are much worn, and only a flattened ovate leaf can be distinguished, with traces of three or four lateral teeth.

Fig. 3a is from a younger specimen.

The Legs are not very long, only attaining a length of about 23mm. Of the three coxæ the second is quite as long as the other two together, and is enlarged distally. The first shows a trace of a distal spur which gives it a rather angular appearance, and the setæ of the distal fringe arise for the most part on tubercular enlargements of the joint. On the second coxa the setæ are linear and dorsal, those of the mid-dorsal row are socketed into small tubercular enlargements of the joint. The third coxa bears a few small setæ dorsally, and a poorly developed distal fringe ventrally. The three following joints are very nearly equal in length, *circ.* 5mm., but the advantage is with the second tibia. On the femur there are five rows of setæ dorsally and laterally, three of which are readily seen, the setæ usually arising from a small tubercle; the other two rows are less conspicuous and contain fewer setæ. In the mid-ventral line there is a row of comparatively stout tubercles. On the two tibiæ the setæ are very much more numerous, and their linear arrangement and tubercular bases are less distinct. They cover both dorsal and ventral surfaces, but a space above the lateral line is left bare. The lateral line is distinct from the first coxa to the end of the second tibia. The distal fringes, though present, are composed of setæ of moderate size, and are therefore inconspicuous. The tarsus is very small and cup-shaped, its ventral surface being

completely covered with stiff setæ, largest distally. The propodus is curved, with a very distinct swelling ventrally at the proximal end; this swelling bears half-a-dozen strong spines, the rest of the ventral surface being occupied by a band of stout spinous setæ about half the size of the proximal group. Dorsally the setæ are fewer and weaker, a narrow space appears devoid of them laterally. The terminal claw is long and slender, about two-thirds the length of the propodus, to which it is articulated at the ventral angle. There are no auxiliaries, and the projecting heel is small.

The Genital apertures of the male occur on the second coxæ of the two posterior pairs of legs; in the female they occur on all the legs, on a conspicuous swelling of the coxa.

The adult male bearing ova, described above, was taken in Winter Quarters in 125 fathoms, on a bottom of small stones and organic débris (June 6, 1903). A smaller specimen, taken at the same time and place, is rather severely mutilated, having lost one of its ovigers and four legs. Its sex is indeterminable, but it is probably immature. The first segment of the trunk is distinct; the others can be traced, but with difficulty. The limbs are much more spinose than in my type; everywhere the tubercular enlargements from which the stiff setæ arise are more abundant, especially on the first coxa and the femur. The oviger also is very different. The first three joints are small, the third having an oblique termination which involves half its length; the fourth is as long as the two preceding, the fifth a trifle longer; the sixth is very short, and the seventh scarcely twice as long. Of the three terminals the middle one is the shortest, the other two being subequal in length. From the sixth each successive joint becomes more slender. The entire appendage is completely devoid of setæ, but on the inner margin of the seventh joint are three curved spines; on the eighth joint there are two, and on the terminal one there are six, one of them occupying the position of the terminal claw. An adult female was taken in 41 fms. (Jan. 30, 1903). The femora contain ripe ova and are swollen in consequence. The setæ are generally finer than those of the male. The oviger, too, resembles that of the male. The denticulate spines are fairly well preserved, and under a high power ($\frac{1}{6}''$ obj.) show a short shaft with three small, but strong, teeth. Then follows a flattened ovoid blade with a minutely toothed margin, the teeth of which are of a totally different character to those on the shaft. On the terminal joint these spines are more curved than elsewhere and the terminal claw does not exist, its place being taken by a much worn example of the denticulate spines. Another occurs more dorsally, but is broken off in this specimen.

I believe I am correct in identifying these specimens with the *P. cornigera* of Professor Möbius and with the *Cordylochele turqueti* of Professor Bouvier. Though I have seen both species, I must admit that I have not examined them with that care that the fact of a second closely allied species having been found demands.

The essential difference between the 'Discovery' and the 'Valdivia' specimens occurs in the length of the legs, which are half as long again in the latter specimens.

Pseudopallene australis.

(Plate I., fig. 2.)

Specific characters :—

Body with lateral processes widely separated, these and the cephalon armed with stout spurs.

Limbs armed with rows of prominent tubercles which bear the setæ. Propodus with few setæ dorsally and a proximal group of three or thereabouts.

Oviger ten-jointed, four terminal joints long and cylindrical. Denticulate spines without lateral teeth at base.

Body rather robust, though more slender than in the last-named species; lateral processes widely separated, and but little longer than the trunk is broad. It is smooth except for the spurs on the cephalon and lateral processes. These are similar to but more upright than those of *P. cornigera.* The segmentation is distinct.

The Ocular tubercle is short, stout, rounded at the extremity, and bears four large well-developed eyes. It rises just clear of the first pair of lateral processes.

The Abdomen is of normal proportions, rather ovoid in shape and without setæ. There is no articulation, and it is directed obliquely upwards.

The length of the body is 6mm. and its extreme width is 3mm.

The Proboscis and the Chelifori are as in the preceding species.

The Ovigers (fig. 2 a) rise just behind the neck, each from a small body-process. The first joint is very small and stout, the second equally stout, but much longer; the third is more slender, and has the usual oblique termination, but is scarcely as long as the two preceding joints; the fourth is nearly as long as the three preceding. The fifth is much the longest of the appendage, slender and rather enlarged distally. The sixth is quite small, about a quarter the length of the fifth. All these joints bear a very few minute setæ, all of which have traces of an enlarged base. The four terminal joints are long and slender, with very little difference in their length; the first is longest, the next two are subequal, and the last the shortest. All are provided with numerous denticulate spines, which occur in a single row (fig. 2 b). They comprise a rather conical shaft, surrounded by a flat leaf-like blade with a finely dentate margin. There is no trace of the stout basal teeth so characteristic of the preceding species. The end of the terminal joint bears two curved spines, which are obviously the same denticulate spines worn down. The character of these four terminal joints differs from those of the preceding species in their more slender and cylindrical form as well as their greater length.

The Legs extend to a length of 23mm. Of the three coxæ the second is quite as long as the other two together; the proportions of the three following joints are as 6 : 5·5 : 5·5 ; the tarsus is very small, the propodus is curved, especially proximally, and rather more than one-third the length of the second tibia. The terminal claw is very long and slender; there are no auxiliaries, nor is there any heel. The setæ, if such they may be called, are small and delicate. They lie in lines parallel to the surface of the joint, and, with very few exceptions, each one occurs on a prominent

tubercular process arched towards the extremity of the limb. They occur distally on the first coxa, dorsally on the second, where there are two rows, and ventrally on the third coxa. Elsewhere there are five rows in which the ventral tubercles are the smallest. Between the two rows on the second coxa distally is a rounded tubercle bearing no seta. The distal extremity of the second tibia is liberally provided with small stout setæ not connected with tubercles; its distal fringe is inconspicuous. The tarsus is covered with setæ which increase in length distally, forming a fringe of long and stout setæ. The tubercular character of the leg completely disappears on this and the succeeding joint. On the propodus there is a scanty supply of minute setæ dorsally, and ventrally at the proximal end of the joint is a well-developed enlargement bearing three spines of moderate strength; the rest of the ventral surface is occupied by a band of small but fairly prominent spinous setæ.

A single specimen of this species was taken off the Barrier, lat. 78° 25′ 40″ S., long. 185° 39′ 6″ E. in 300fms. Bottom, mud.

It is an adult female, with the Genital apertures prominent on the second coxæ of all the legs.

PALLENOPSIS.

Body slender or robust, distinctly segmented.

Proboscis cylindrical, ventral in origin, flexibly united to the trunk.

Abdomen long and slender.

Chelifori well developed; scape long, two-jointed.

Palps reduced to a more or less conspicuous knob.

Ovigers ten-jointed, present in both sexes, without a terminal claw or denticulate spines.

Legs with auxiliary claws. A tubular duct occurs in a mid-ventral position on the femora of the male.

Ocular tubercle placed anteriorly on the cephalon, with two unequal pairs of eyes.

As above stated, the generic definition is much altered from the original of Prof. E. B. Wilson (32). Besides the two new species described below, no less than thirteen have from time to time been recorded, all of them from a strictly limited number of specimens. They are separated by characters which, when committed to paper, do not appear as definite as one would like. Nothing is known with regard to the variation which may occur within the limits of "a species," and so it must remain open to question whether I have taken the right course with reference to *P. hiemalis* and *P. pilosa*, Hoek, or not.

Pallenopsis glabra.

Pallenopsis glabra, Möbius (23), p. 184.

Specific characters :—

Body comparatively slender, with lateral processes widely separated, and with two small tubercles dorsally.

Chelifori well developed, scape two-jointed, the whole limb minutely scabrous.

Palps reduced to a conspicuous stump.

Ovigers ten-jointed, without claw or denticulate spines.

Legs long, covered throughout with minute spinous setæ.

I am unable to find any satisfactory grounds for separating this species from that of Professor Möbius. A full description follows, as that of Professor Möbius is scarcely sufficient on small points. Body comparatively slender, with the lateral processes widely separated and slightly increasing in length to the third, which is directed backwards.

The Cephalon is long, rather broader than the rest of the body, bevelled anteriorly to form a median point, immediately behind which lies the stout ocular tubercle. This is stout, erect, rounded in front, and terminating in a short spine on the posterior half of the tubercle above the eyes. The four eyes are well developed, the anterior pair being much the larger. The Ovigers arise on small body-processes immediately in front, and rather below the level of the first lateral pair.

The Abdomen is very long, slightly curved, and with a clavate extremity; it is not articulated to the trunk, and is directed obliquely upwards at a considerable angle. It is covered with minute curved spines.

The segmentation of the trunk is rendered conspicuous by a slightly raised ridge forming the posterior border of the segment, these ridges are rather more prominent ventrally, and in both cases bear a few minute spines. Similar spines occur on the lateral processes, and form a distal fringe round them.

The Proboscis is movably articulated to the trunk and directed downwards, its origin is ventral, and at the proximal end of the cephalon; it is cylindrical, tapering slightly, its distal extremity rounded and the mouth small. It is completely covered with minute spines except for a narrow band in the mid-ventral line.

The Chelifori are well developed, and arise close to the middle line, their origin occupying almost the entire width of the cephalon. The scape is two-jointed, and half as long as the trunk measured to the base of the abdomen; the two joints are sub-equal in length, the second being expanded distally. The chela is directed downwards, the palm rather curved, and fully as long as the other joints. The small dactyli are directed inwards, the movable one having a spinous cushion at the base. The entire appendage is covered with minute spines, largest and most numerous on the second joint of the scape, the distal fringe of which is also more conspicuous.

The Palps are stout single-jointed stumps arising from the sides of the cephalon, about the middle of its length.

The Oviger is ten-jointed. The first joint is very short and stout, the second is much longer, clavate and setose on its outer margin; the third is shorter, curved, and having a very oblique termination; it is also setose on its outer margin. These three joints form a curve in one direction, and the following three curve in another. The fourth and fifth joints are comparatively long and sub-equal, both slightly curved, the fourth setose on both sides, the fifth only on its outer margin; the sixth joint is short and much curved, and from this one the remaining joints become shorter, more slender, and more setose, the setæ being longer than elsewhere. There is no terminal claw, nor denticulate spines.

The Legs are long, attaining a length of 69mm. The lateral line is conspicuous, beginning on the lateral processes and extending to the end of the second tibia. Of the three coxæ the second is longer than the other two together, all three are thickly covered with small spinous setæ on the ventral surface, but, except on the first coxa, there are none dorsally. The proportions of the three following joints are as 17 : 14·5 : 21. The femur is fairly well covered with minute setæ ventrally; dorsally they are much less numerous, except at the distal extremity. A linear arrangement of the setæ is observable, but it is not very regular, a distal fringe is not very prominent, and almost confined to the dorsal side. On the first tibia the setæ become more numerous dorsally, they preserve the same general arrangement, but there are longer setæ mixed with them. On the second tibia this becomes much more pronounced, and ventrally the setæ are so numerous that the linear arrangement is completely obscured; the distal fringe on both joints is well developed, more especially so on the ventral side of the second tibia. The tarsus is very small, the ventral surface being double that of the dorsal; the former is covered with long spinous setæ, most prominent distally, like those of the distal fringe of the preceding joint, dorsally they are smaller, but form a well-developed fringe. The propodus is slightly curved, and completely covered with small spinous setæ, and some of these form a distal fringe over the insertion of the terminal claw and its auxiliaries. At the proximal end of the joint is a series of some half-dozen short spines, the centre ones being the largest; beyond these a group of stout spinous setæ extends to the end of the joint. The terminal claw is short, half the length of the propodus, and the auxiliaries are about half its size.

Of the two specimens obtained one is a male, and the Genital apertures occur on a slight swelling at the distal extremity of the second coxæ of the two posterior pairs of legs. On the ventral surface of the femur is a swelling about the middle of its length, and this bears a short but stout duct characteristic of the males of this genus. The Genital apertures of the female occur on a very pronounced swelling, in a similar position to those of the male, but on all the legs.

This specimen is remarkable for having the first leg of the right side complete in all essential details, but not extending beyond the distal extremity of the femur of the normal limb.

Winter Quarters, off Flagon Point. January 17th, 1903. 5–20 fm. Very rough ground.

Pallenopsis villosa.

(Plate II., fig. 1.)

Body robust, with lateral processes rather close together. Entire animal clothed with long, slender setæ, giving it a woolly appearance.

Chelifori well developed, scape two-jointed, no setous cushion at the base of the dactylus.

Palps reduced to a knob.

Oviger ten-jointed, without claw or denticulate spines.

Legs densely clothed with fine setæ, propodus with several strong spines ventrally; one or two of the proximal ones are much the largest.

Body robust, with the lateral processes distinctly, but not widely separated. Segmentation is complete, and in the case of the trunk it is rendered very prominent by each segment to some extent overlapping the following one ; this is most noticeable ventrally.

The Cephalon is large, with a distinctly constricted neck. At its extreme anterior end, which is straight, the stout rod-like ocular tubercle projects slightly forwards; this is rounded at its extremity, where there are four well-developed eyes, the anterior pair very much larger than the posterior.

The Abdomen is long and distinctly articulated to the trunk; it increases in diameter to a short distance from its extremity, when it abruptly tapers to a blunt point. About its middle it is provided with a considerable number of long slender setæ. Similar setæ fringe the anterior border of the cephalon, the distal extremities of the lateral processes, and the posterior border of each segment. None of these setæ are present ventrally. The length of the body is 10mm., and its width is 6·5mm. The abdomen measures barely 4mm.

The Proboscis is stout, cylindrical, rounded at the extremity, and articulated to the trunk on the ventral surface, and therefore directed downwards. The mouth is small. It is liberally covered with short setæ. In length it is scarcely half that of the body.

The Chelifori are long and chelate; they arise quite close to the middle line underneath the anterior border of the cephalon. The scape is stout and two-jointed, measuring some 5mm. in length; the two joints are sub-equal and covered with long slender setæ, the second joint more abundantly so, especially distally. These setæ are confined to the dorsal surface; a row exists ventro-laterally, but ventrally they are replaced by very short setæ. The third joint, forming the chela, is directed downwards, and is shorter than the preceding. It is covered all over with setæ, shorter than the average, but varying in length from the proximal to the distal end; on the outside of the movable finger is a dense tuft of long setæ (fig. 1a). The dactyli are turned inwards, the movable one being the longer. They are curved at the tips, which cross over each other, and are devoid of teeth.

The Palps arise at the side of the proboscis, and are nothing more than rounded knobs.

The Ovigers are ten-jointed, and without terminal claw or denticulate spines (fig. 1b). They arise ventro-laterally between the base of the proboscis and the first lateral processes. All the joints are small, and the appendage is curved like an attenuated **S**, and setose throughout. The first joint is small and stout, the remainder gradually decrease in breadth; the second is about twice as long as the first; the third is intermediate between the two, and has a very oblique termination. These three joints bear long setæ on the outside of the curve formed by them. The fourth joint is the longest on the appendage, and slightly curved; it bears a few long setæ on the inner side, and numerous short ones on both. The fifth joint is not so long, also slightly curved and dilated distally with long setæ on its outer side. The sixth joint is shorter and slightly curved; it is thickly clothed with long setæ, and bears a few

on the opposite side distally. The seventh, eighth, and tenth joints are sub-equal in length, and the ninth is a little shorter. The arrangement of the setæ is the same as on the sixth joint, except that the distal group on the outer side increases on each joint, so as to involve the whole of it. The setæ on the five terminal joints are very long and quite simple.

The Legs are very stout, and some 36mm. in length. The first coxæ are about as long as their corresponding lateral processes ; the second are longer, and, in the female, bear a conspicuous enlargement ventrally near the distal extremity, upon which the large genital openings occur ; these are on all the limbs. The third coxæ are about the same size as the first. The three following joints differ but little in size, being proportionally as 8·5 : 9 : 9·5. The tarsus is very small, and the propodus is about a quarter the length of the second tibia. The entire limb is clothed with setæ. Dorsally the three coxæ each bear a prominent distal fringe of long setæ. The first has two lateral bands in addition, while the other two are more completely clothed. Ventrally the third coxa is partially covered with small setæ, and has a prominent distal fringe of longer ones, the other two only possess a distal fringe of short setæ. On the femur the dorsal surface is covered with long setæ, which also form a prominent distal fringe ; the ventral surface bears only small setæ, but on each side there is a band of the large ones just below the well-developed lateral line. This arrangement holds good on the two tibiæ, but the setæ are much more thickly set. At the distal extremity of the second tibia the setæ become spinous ventrally, and as spines form the distal fringe on that side. The ventral surface of the tarsus is clothed with spines which are large distally ; dorsally there is a fringe of setæ only. The propodus is covered dorsally with setæ of more moderate length than those on the appendage generally ; laterally they are smaller still, and along the ventral aspect there is a row of about a dozen strong spines, a little irregular in size, but one or two of the proximal ones are much the largest. There is no projection of the propodus beyond the insertion of the terminal claw, which is stout and rather more than half the length of the joint that bears it. It is accompanied by two small auxiliaries.

The single specimen is an adult female, and contains ripe ova.

Taken off Coulman Island in 100 fm., on mud and stones, January 13th, 1902.

Pallenopsis pilosa.

(Plate II., fig. 2.)

Phoxichilidium pilosum, Hoek (14). p. 90.
Pallenopsis pilosa, Hoek (16). p. 9.

Specific characters :—

Body not very robust, with lateral processes not widely but distinctly separated. Body (dorsally) and legs covered with extremely long thin hairs.

Chelifori well developed, scape showing distinct articulation on the dorsal surface. No setose pad at base of dactylus.

Body fairly robust, with lateral processes distinctly, but not widely, separated; two pairs directed forwards and the other two backwards.

Cephalon stout, longer than two segments of the trunk, cylindrical, with its anterior border bevelled on each side; near the point thus produced lies the Ocular tubercle. This is short and stout, capped by a blunt point below which are four well-developed eyes; the anterior pair larger than the posterior pair.

The Abdomen is long and slender, terminating in a blunt point, and bearing numerous long setæ.

The segmentation of the body is perfect, and on the posterior margin of the three anterior segments are two tufts of long slender setæ, a number of which occur also on the lateral processes, and also form the distal fringe. The ventral surface is devoid of setæ.

The length of the body is 10mm., its width 5mm. The abdomen measures 4mm. in length.

The Proboscis is ventral in position, directed downwards and movably articulated to the trunk. It is cylindrical, terminating in a blunt cone; mouth small, covered with small setæ 4mm. long.

The Chelifori are well developed; they arise close to the middle line in front of the cephalon, and extend considerably beyond the proboscis. The scape is long and single-jointed, though dorsally there is a slight enlargement about the middle of its length, indicating a possibly fused joint. Numerous long and slender setæ are distributed over the scape. Distally the setæ are smaller, and there is a strongly developed distal fringe. The chelæ are comparatively small, and hang vertically. The palm is scarcely more than a quarter the length of the scape, covered with short stiff setæ. The fingers are small, and directed inwards at a considerable angle from the palms; the movable finger is nearly twice the size of the other, but neither bears any trace of teeth.

The Palps are quite rudimentary, being nothing more than a small but conspicuous rounded stump at the side of the proboscis, well behind the ocular tubercle when viewed from the dorsal aspect. They bear a few small setæ.

The Ovigers occupy a lateral position immediately in front of a shallow groove separating the cephalon from the first lateral processes. They are ten-jointed (fig. 2). The first joint is small and stout; the second is about three times as long, enlarged distally; the third is intermediate in length between these two; the fourth is long, about as long as the two preceding joints, and very stout; the fifth is very little longer, slightly narrowed in the centre, and expanded distally; the sixth is stout, and not half the length of the fifth. All these joints bear a few short setæ, most numerous on the outer side of the fifth and sixth joints. The seventh joint is longer than the sixth or the two following together; of these the proximal is shorter, the terminal joint (missing in the appendage examined in detail) is quite small and without a terminal claw. The last four joints bear long and stout setæ of a simple character. There are no denticulate spines.

The Leg attains a length of 32mm. Of the three coxæ the second is about as long as the other two together, and is much enlarged distally. The first bears a mid-dorsal row of a few long setæ and a distal fringe of the same kind. The second bears two dorso-lateral rows and the distal fringe; and ventrally, a conspicuous fringe between the distal extremity and the genital apertures. The third coxa is covered ventrally and laterally with setæ and carries ventrally a very prominent distal fringe. The proportions of the three following joints are 8·5 : 8·5 : 10, these joints are covered with lines of very long slender setæ, their great length making it difficult to determine the precise number of rows. On the femur they are most abundant ventrally, except near the distal extremity. On the two tibiæ the ventral surface is much more scantily supplied. The distal fringe of the second tibia is rather spinous ventrally. The tarsus is very small, setose, and with a few spinous setæ at its ventral extremity. The propodus is curved, covered with rather short setæ, a fringe of longer ones distally; there is no heel. Ventrally at the proximal end of the joint are two or three stout spines, and a band of smaller ones of irregular size extends to the end of the joint. The terminal claw is long and slender, with two well-developed but not large auxiliaries. Small setæ also occur more or less abundantly throughout the limb.

The Genital apertures of the female occur on the enlarged part of the second coxa of every leg. In the male these orifices occur at the apex of a pointed tubercle on the two posterior legs only. The male as a rule is more setose than the female, and on the mid-ventral surface of the femur there is the duct so characteristic of the males of this genus; in this species it is long and slightly twisted, conspicuous even among the long setæ. The joints of the ovigers up to the sixth joint are more strongly developed, longer, and all are more setose than those of the female. One specimen has three perfect ovigers, two on one side being in contact with one another. The eggs are rather large, and held round each oviger in a single rounded mass.

Several specimens of this species were taken off the Ice Barrier in the Ross Sea, 300fm., mud bottom. I am unable to find any satisfactory reason for separating them from the species of Dr. P. P. C. Hoek. They are smaller, and the only character which can be used to separate them is the comparative length of the four terminal joints of the oviger, but this does not seem to me to be sufficient.

Pallenopsis hiemalis.

(Plate I., fig. 4; Plate II., fig. 3.)

Body well built, with lateral processes widely separated, but of variable length, and having a tubercular swelling at the dorsal extremity.

Chelifori and abdomen both proportionally long.

Palps, a rather long stump.

Legs clothed with short, stiff setæ.

Body well built, with the lateral processes rather widely separated, as long as the trunk is broad, and each bearing distally a stout tubercle of no great elevation.

The Cephalon is elongated, but not much enlarged in diameter, with a very slightly constricted neck between the first pair of lateral processes and the small body-processes from which the ovigers arise, and which are plainly visible dorsally. The anterior margin of the cephalon is angular, and the Ocular tubercle arises at its front. This is stout, directed very slightly forwards, and terminates in a point above the four well-developed eyes; the anterior pair are larger than the posterior.

The Abdomen is long, not articulated to the trunk, and slightly enlarged before it terminates in a blunt point; it is directed upwards to a moderate extent. The length of the body is 11mm., its width 4·75mm., and the length of the abdomen is 3·75mm. A few small, stiff setæ occur dorsally at the posterior margin of the segments and at the extremity of the lateral processes.

The Proboscis is stout, cylindrical, rounded at the extremity; the mouth is small. Ventrally it measures 4mm. in length and, except in the mid-ventral line, it is closely covered with small, stiff setæ. It is ventral in position, directed obliquely downwards, and articulated to the trunk.

The Chelifori are well developed, and arise close together above and in front of the proboscis. The scape is long and stout, projecting beyond the extremity of the proboscis, though only 4mm. long. It is divided by a distinct joint into two sub-equal portions and covered completely with short, stiff setæ; the second joint is expanded distally and has an oblique termination. The chela is well developed, the palm being rather shorter than the joints of the scape, but like them densely setose. The dactyli are set on its inner extremity and lie transversely. They are short and stout, smooth without teeth; the movable one is the larger, and has a setose pad at the base.

The Palps are stout, single-jointed, rather long stumps; they arise from the sides of the cephalon about the middle of its length.

The Ovigers are ten-jointed, without terminal claw or denticulate spines (fig. 4a). The appendage arises on a small process of the body in front of the first lateral process. The first joint is short and very stout; the second is at least twice as long, slender proximally, much dilated distally; the third is shorter, and the oblique articulation of this joint with the next renders the fourth to all intents and purposes lateral; the fourth is the longest of the appendage and stout; the fifth shorter, and the sixth shorter still. The limb is curved in the form of an **S**, the first three joints forming the curve in one direction, the three following curve in another. Of the four terminal joints the seventh is short, the eighth is longer, the ninth and tenth progressively shorten. The entire appendage is setose, the setæ are small and rather sparse proximally, becoming more numerous to the fifth joint; from that joint onward they are longer, but quite simple, and more completely clothe the joints.

The Legs extend to about 38mm. Of the three coxæ the second is fully twice as long as the other two together, and bears a low rounded tubercle dorsally, just beyond the middle of its length. The first coxa carries dorsally a stout but short tubercular process, similar to, but smaller than, that of the lateral process. The proportions of

the three following joints are 9 : 8·5 : 11·5. The tarsus is very small, and of the normal shape. The propodus is one-third the length of the femur, very slightly curved. At the ventral side of the extremity is a stout claw, with two well-developed auxiliaries; the heel does not project beyond the insertion of these claws. The joint is uniformly clothed with short spinous setæ, and there is dorsally a projecting fringe. Ventrally there is a row of stout spines, of which some half-dozen, not very regular in their position, are very prominent (fig. 3). The entire limb is uniformly and densely clothed with very short, stiff setæ, and these, as is usually the case, are more numerous and longer on the second tibia; the distal fringe on this latter joint is prominent, with at least one stout spine ventrally. The ventral setæ on the tarsus are also spinous, one being particularly large. The lateral line is very prominent from the lateral processes to the tarsus, both inclusive.

The specimen is a female and bears Genital apertures on a swelling of the second coxa of every leg.

Winter Quarters, inside the 20-fm. line.

A specimen was taken off Cape Wadworth, Coulman Island, which, notwithstanding certain important differences, I cannot regard as being specifically distinct. It is a male, and rather larger than the type. The obvious differences lie in the much greater length of the lateral processes and the character of the ventral spines on the propodus (fig. 3a). With regard to the first of these features, the third lateral process of the right side is but little more than half the length of the others; the first coxa, the only joint of that appendage that exists, is also abnormally small, though there are no definite traces of injury. The other feature rests on the armature of the propodus. The ventral surface of this joint bears proximally three very stout spines, and from there to the extremity is a band of spinous setæ.

The length of the body is 12mm., of the trunk only 9mm., and its extreme width is 6mm., rather larger, especially in the last measurement, than the type. The chelifori (scape) and the abdomen are a little shorter. The oviger differs only in being much stronger; the setæ are more numerous and also stronger. The fifth joint is however longer, nearly equalling the fourth. This is a not uncommon sexual difference. The lateral processes and the first coxa exhibit in a less degree the tubercular processes of the type.

The proportions of the three principal joints of the legs are 9·75 : 8·5, and 12, a difference of no importance. These limbs are setose throughout, though the setæ are rather deficient proximally, becoming much more abundant on the tibia. Ventrally they are very small, stiff, and crowded; dorsally much less numerous. They have among them a number of much longer and more slender setæ. The tarsus is coarsely setose ventrally, with one very prominent spine. The distal fringes of the joints are not strongly developed; that of the second tibia is chiefly ventral and spinous. The lateral line is very distinct from the lateral process to the end of the second tibia. The femur is swollen ventrally near the middle, and bears a very short but stout tubular duct.

Another specimen, a male, was taken in Winter Quarters, inside the 20-fm. line before the ship was frozen in. It is in a severely mutilated condition, having lost the posterior segment of the trunk and several legs. It differs slightly from the male above described, the lateral processes being a little closer together and the body, especially the cephalic portion, being a trifle stouter, and the tubercular knobs on the lateral processes not being so distinct, but all these features can, I think, be readily accounted for by age.

This species is closely allied to *P. patagonica*, Hoek.

NYMPHON.

This genus is perhaps the most widely distributed and best known of all the genera of Pycnogonida. It is readily distinguished from all others by the well-developed chelifori, the five-jointed palps, and the ten-jointed ovigers, the four terminal joints of these being provided with a single row of denticulate spines. The form of the body varies greatly within certain limits, and Professor Sars (25) has subdivided the genus into three :—

Nymphon retains the more slender and comparatively long-legged species.

Chætonymphon the more robust and short-legged species, which also, as a rule, are more setose on the body than those of the original genus, *Nymphon*.

Boreonymphon, another robust form, readily separable from the others by the absence of teeth on the chelæ, the spines of the ovigers being simple and not denticulate.

The species brought back by the 'Discovery' are eight in number; four are assigned to the original genus, though one of these, *N. adareanum*, bears a few simple spines on the oviger instead of the rows of denticulate spines. The other four, of which one, for the present at least, is regarded as a southern variety of a previously described species, are assigned to the genus *Chætonymphon*.

Nymphon hiemale.

(Plate III., fig. 1; Plate X., fig. 8.)

Specific characters :—

Body slender, with rather long lateral processes very widely separated. Limbs covered with very minute setæ.

Ocular tubercle stout and short.

Palps five-jointed, proportions of last three as 7 : 4 : 5·5.

Oviger ten-jointed, denticulate spines rather numerous, with eight to ten teeth on each side.

Legs long, scabrous, terminal claw with well-developed auxiliaries.

Body smooth, slender, with rather long lateral processes, which are very widely separated; the first of these is curved forwards. The segments are very strongly marked immediately behind the lateral processes.

The Cephalon is long, the greater part of its length is taken up by a slender

neck; anteriorly it is much expanded, the two lobes being separated by a small but conspicuous groove.

The Ocular tubercle is situated immediately in front of the first lateral processes; it is comparatively stout, short, truncate, and bears four well-developed eyes without any pigment.

The Abdomen is small, ovoid, does not project beyond the last pair of lateral processes, and is not articulated to the trunk. The length of the body is 7·5mm. and its width is almost 4mm.

The Proboscis is cylindrical, smooth, and directed obliquely downwards; it is about 3mm. in length.

The Chelifori are well developed. The scape is as long as the proboscis, slightly curved and sparsely covered with minute setæ; the distal fringe is not conspicuous. The chelæ are also curved, half their length being taken up by the palm, which is finely setose, the setæ extending on to the base of the immovable finger. The fingers are slender, much incurved at the tip. The teeth are numerous and regular in size, not so closely set in the immovable finger as in the other.

The Palp is slender, five-jointed, and rises at the side of the proboscis below the chelifori (fig. 1a). The first joint, as usual, is very small; the second is the longest of the appendage, slightly swollen distally, and sparingly covered with minute setæ. The third joint is but a little shorter, rather stouter, and more liberally supplied with short setæ, though these are still scanty. The fourth joint is scarcely half as long as the second, very richly supplied with short setæ on its ventral margin, much more sparingly dorsally. These three joints have a well-defined distal fringe. The terminal joint is nearly half as long again as the preceding and, like it, richly clothed with short setæ ventrally, more sparingly dorsally.

The Oviger is ten-jointed, and arises ventro-laterally in front of the first lateral process on a prominent body-process, the position of which is clearly seen from the dorsal surface (fig. 1b). The first three joints are small and stout, the third curved and having a very oblique termination; only a distal fringe of very small setæ can be detected on these joints. The fourth joint is very long, slightly curved, with very few minute setæ besides the distal fringe. The fifth joint is much the longest of the appendage, and is thinly covered with very small setæ, with a more strongly marked distal fringe. The sixth joint is little more than half as long as the preceding, slightly curved, and thickly clothed with small stiff setæ on its outer side and a well-developed distal fringe. The four terminal joints are long, progressively decreasing in length, but the last two are sub-equal. All are more or less well supplied with short stiff setæ dorsally and a distal fringe of rather longer setæ. The terminal claw is long and slender, with about fourteen curved teeth. The denticulate spines are long, and in the specimen critically examined occur 13 : 10 : 10 : 9 on the various joints. (Plate X., fig. 8.) The shaft is flattened and slender, and carries eight to ten teeth on each side; the third or fourth

from the base is the largest, the remainder tapering off to very minute proportions. The eggs are small and the spherical mass is packed round the proximal part of the fifth joint.

The Legs are long and slender and attain a length of about 45mm. The second leg of the right side has in this case been selected for measurement. Of the coxæ the first and third are sub-equal, the second being quite as long as the other two together. The proportions of the three following joints are as 10 : 11 : 16, and the tarsus and propodus taken together are 4·5, the former joint being a little the longer of the two. A lateral line is plainly visible on the femur and to the end of the leg. On the femur such setæ as exist are extremely minute; on the second tibia they are very numerous but small, arranged principally dorsally and ventrally, with a distinct distal fringe. On the tarsus and propodus the arrangement is the same, but the setæ are even more crowded. Ventrally on the propodus is a row of about a dozen comparatively strong spines, more distally than proximally. There is a distinct heel fringed with rather long setæ. The terminal claw is stout and accompanied by two auxiliaries about one-third its size.

The Genital apertures of the male are found on the second coxæ of the two posterior legs, those of the female being found on all the legs.

A number of specimens were taken in Winter Quarters in 125 fm.

Nymphon lanare.

(Plate III., fig. 2; Plate X., fig. 9.)

Specific characters :—

Body very slender, with lateral processes long and widely separated.

Ocular tubercle short and stout.

Palps five-jointed, proportions of last three 10 : 9 : 11.

Oviger ten-jointed, denticulate spines, about double the number on the first joint as on any of the others, with five to seven teeth on each side.

Legs long and slender, with long and fine setæ, terminal claw long, without auxiliaries.

Body very slender, with lateral processes long and very widely separated.

The Cephalon is long, expanded anteriorly into two lobes separated by a narrow groove. The neck is elongated, and at its base, ventrally, are small body-processes for the attachment of the ovigers, visible from the dorsal aspect.

The Ocular tubercle is short, stout, and truncated; it lies immediately in front, but not quite clear of the first pair of lateral processes. It bears four well-developed eyes.

The Abdomen is quite small, and does not extend as far as the posterior lateral processes. It is directed slightly upwards, and not articulated to the trunk. The length of the body is 8·5mm., and its width 5mm.

The Proboscis is cylindrical, slightly swollen in the middle, its extremity being rather angular. Together with the body, it is quite devoid of setæ.

The Chelifori are well developed, long and slender. The scape is single-jointed, longer than the proboscis, but scarcely as long as the chela. It bears but few setæ,

except a distal fringe of long and slender ones. The palm of the chela occupies about half its length, and bears a number of fine setæ dorsally. The fingers are long, slender, incurved at the tips, and provided with numerous slender teeth, irregular in size and not very closely set.

The Palp arises laterally at the side of the proboscis (fig. 2a), and comprises the normal five joints, all of which, except the first, are very long and slender, the proportions being 10 : 10 : 9 : 11. Setæ are non-existent on the first two joints; on the third scanty, most numerous on the terminal joint, but not very thickly distributed there; they are small, rather delicate, and occur mainly on the outer side of the limb.

The Oviger has the normal ten joints, and arises on a small ventro-lateral body-process just in front of the first pair of lateral processes (fig. 2b). The first three joints are small, but progressively lengthen, the third having the usual oblique termination. The fourth joint is long, the fifth longer, and the sixth still long, though the shortest of these three, the proportions being about 7 : 8 : 5. The sixth joint is rather thinly covered with small setæ on its outer side, and has a well-developed distal fringe. The preceding joints have so few minute setæ between them that they are scarcely noticeable. Of the four terminal joints, the first is about twice the length of the next; the other three differ very little in size, but the middle one is the smallest. All are provided with a few small setæ and distal fringes. The terminal claw bears a dozen slender teeth rather closely set. The denticulate spines form a single row (plate X., fig. 9). They consist of a stout shaft, which begins to taper at about a quarter of its length, where the denticulations begin. Of these there are from five to seven; the first is small, the next three large, and the remainder more or less vestigial. Of these spines there are 10 : 5 : 4 : 5 respectively on the various joints.

The Legs are long and slender, attaining a length of nearly 45mm. The three coxæ are long, the second being longer than the other two together; these joints are rather scantily clothed with setæ of no great length. The proportions of the following joints are 8·5 : 9·5 : 12 : 4 : 3. The terminal claw is very long and slender, more than half the length of the propodus, and there are no auxiliaries. The limb is clothed with setæ, not very closely set, in a linear manner. On the femur and tibia they are very long and slender, becoming reduced in size on the tarsus, while on the propodus they are very small.

Two examples of this species were taken off the Barrier in 300fm., bottom mud, 27th January, 1902.

Nymphon adareanum.

(Plate III., fig. 3.)

Specific characters :—

Body smooth and slender, with lateral processes widely separated.
Ocular tubercle short, rounded.
Palps five-jointed, proportions of last three 2·5 : 1·25 : 1·75.
Oviger ten-jointed, without denticulate spines, but with very few simple curved spines.
Legs of moderate length, with rather long setæ, terminal claw with two well-developed auxiliaries.

This small species has a fairly well-built body, with the lateral processes rather widely separated, and as long as the diameter of the trunk. The trunk articulations are very distinct, and immediately behind the lateral processes. No setæ of any kind are to be seen on the body.

The Cephalon is stout but not widely expanded, showing two distinct lobes for the reception of the chelifori; it is not quite as long as the second and third trunk segments together.

The Ocular tubercle is very stout, of small elevation, rounded at the summit, and carries four well-developed eyes. It lies just in front of the first pair of lateral processes and behind the neck.

The Abdomen is of moderate dimensions, curved upwards, and not separated by an articulation from the trunk.

The length of the body is 2·75mm., and its extreme width 1·5mm.

The Proboscis arises on the ventral side of the trunk, and measured ventrally it is nearly one-third the length of the entire body. It is stout, gently tapering to a rounded extremity, quite smooth.

The Chelifori are well developed; the scape is single-jointed, extending beyond the proboscis; provided laterally with comparatively long setæ. The chela is not very long, the palm and fingers occupying approximately equal halves; the former is covered with setæ, and the fingers, rather curved, are supplied with a very moderate number of slender teeth rather widely separated.

The Palp is five-jointed, and rises underneath the chelifori (fig. 3a); as usual, the first joint is very small and the second long. Owing to distortion in mounting this appendage, the comparative length of the second and third joints cannot be very accurately stated, but the second appears to be twice the length of the third; the fourth is half the length of the third, and the fifth is longer than the preceding, the proportions being 5 : 2·5 : 1·25 : 1·75. The terminal joint is ovoid, and fairly well supplied with comparatively long setæ; the three preceding joints have well-developed distal fringes and a small number of setæ scattered along the shaft; these are most numerous on the third joint.

The Oviger is ten-jointed, and rises from a small process of the trunk, visible dorsally, just in front of the first pair of lateral processes (fig. 3 b). The first three joints are very small; the second and third are subequal in length, the latter much the more slender; the fourth is longer than the three preceding ones together; the fifth is twice as long, much curved, and bears a few setæ on its outer margin; the sixth is half as long as the fourth. The four terminal joints are very small, the first being the largest, and all bear two or three long setæ distally. The terminal claw is long and slender, with five slender teeth set at irregular intervals. Of denticulate spines, such as characterise the genus *Nymphon*, there are none, but of special spines there are 2 : 2 : 2 : 1 on the four joints; these are curved blades without any other distinguishing feature.

The Legs are not very long, extending to nearly 11mm. from the trunk. Of the three coxæ, the second is as long as the other two together, the first being by a little the smallest; the proportions of the remaining joints being 4 : 5 : 6 : 0·75 : 2. The terminal claw is large and stout, with two well-developed auxiliaries. The lateral line is distinct throughout. The setæ have a rather indistinct linear arrangement, those on the sides of the coxæ are prominent, especially on the second; on the third they are more confined to the ventral surface, and the distal fringe is fairly well developed. On the femur the setæ are long and straggling, chiefly lateral, and ventrally there is a row of small tubercles. On the two tibiæ, but more especially the second, the setæ are most abundant, largest on the first. Ventrally they are much smaller, the distal fringe of the second tibia becoming spinous. The tarsus is a very short joint with long setæ dorsally, smaller and more numerous ones ventrally, which become delicate spines distally. The propodus is covered with setæ dorsally, and ventrally there is a row of rather strong spines, and of these the middle ones are strongest.

The single specimen is a male, carrying young, apparently just hatched. The Genital apertures are to be found on the second coxæ of the two posterior pairs of legs.

From the root of a Laminarian taken in 17 fm., Cape Adare, 24th February, 1904.

Nymphon frigidum.

(Plate III., fig. 4; Plate X., fig. 10.)

Specific characters :—

Body very slender, with lateral processes long and very widely separated.

Ocular tubercle very short, stout.

Palps five-jointed, proportions of last three 3 : 1·5 : 3.

Oviger ten-jointed, denticulate spines not very numerous, with five to seven lateral teeth.

Legs long and slender, propodus with ventral row of spines, a large terminal claw and two auxiliaries.

Body well built, perfectly smooth, with the lateral processes widely separated and rather long, much more slender than the trunk.

The Cephalon is rather long, with a distinct neck and expanded anteriorly into the two normal lobes.

The Abdomen is short, directed obliquely upwards, and not projecting beyond the posterior pair of lateral processes.

The Ocular tubercle is stout, very short, and bears four well-developed eyes.

The length of the body is 2mm., and its extreme width is 1·2mm.

The Proboscis is cylindrical, directed downwards.

The Chelifori comprise a single-jointed scape, slender, and covered with a small number of fine setæ. The chelæ are well developed, the palms being about half their length, and setose; the fingers are not much curved, provided with a number of teeth, not very closely set, and of uniform size.

The Palp is five-jointed and rises underneath the chelifori (fig. 4a). The first

joint is small, and the proportions of the remainder are 4 : 3 : 1·5 : 3. The terminal joint is well supplied with setæ on the outer side, and the preceding one is similarly, but less well, provided. Elsewhere they are scanty, a few on the third, and only an occasional one on the second.

The Oviger is ten-jointed, and rises from a small process immediately in front of the first pair of lateral processes (fig. 4b.) The first joint is very small, the two following are longer and subequal, the third having as usual a very oblique termination. The fourth and fifth joints are subequal, and each much longer than the first three together; the sixth is half as long as the preceding. Of the four terminal joints the first is the longest, the rest differ but little, but the last is longer than the others, and bears a terminal claw with some half-dozen teeth. A limited number of setæ occur on all the joints from the end of the fourth. The denticulate spines are not very numerous, 8 : 5 : 4 : 5, and consist of a slender tapering shaft with from five to seven lateral teeth; the second from the base is strongly developed, the rest graduated to nothing (plate X., fig. 10).

The Legs are long and very slender; they are about 9mm. long. Of the three coxæ the second is longer than the other two together, the proportions of the remaining joints being 4 : 4·5 : 7 : 1 : 1·5. The terminal claw is more than half as long as the propodus, and is accompanied by two slender auxiliaries. The entire limb is rather thinly clad with setæ, which, as usual, are most abundant on the second tibia. The propodus bears ventrally a row of comparatively strong spines, not very regular, the middle ones being generally best developed.

This is not a mature form, and the sexual apertures cannot be distinguished. I am unable to identify it with *Nymphon hiemale*, though it occurs in the same locality, and feel compelled to regard it as an independent species.

CHÆTONYMPHON VILLOSUM.

(Plate IV., fig. 1; Plate X., fig. 11.)

Specific characters:—

Body robust and with the appendages covered with long and fine setæ; lateral processes close together.

Ocular tubercle rather tall, with four eyes at summit.

Palp five-jointed, proportion of last three 6 : 2 : 3.

Oviger ten-jointed, denticulate spines not numerous, having five to seven lateral teeth on each side.

Legs short, with a strong terminal claw and two well-developed auxiliaries.

Body very robust and, with the appendages, covered with long and fine setæ. The lateral processes are close together, and these, being stout, give the body a compact ovoid form.

The Cephalon is short, much expanded, and the neck, which thereby becomes distinct, is scarcely a real constriction, the expanded portion being divided into two distinct lobes, bearing a few long setæ distally. Similar setæ occur dorsally on

each segment of the trunk and on the lateral processes, in addition to the distal fringe. There are none ventrally.

The Ocular tubercle rises from the neck immediately in front of the first pair of lateral processes; it is moderately tall, cylindrical, and bears at its rounded summit four well-developed eyes.

The Abdomen is long and slightly ovate; it projects beyond the first coxæ of the posterior pair of legs in their normal position, and bears a few small setæ.

The length of the body is 6·5mm. and its width is scarcely 4mm.

The Proboscis is stout, cylindrical, and inclined downwards; it is quite devoid of setæ of any kind, and 2·5mm. long, measured dorsally.

The Chelifori are strongly developed; the scape is stout and single-jointed; it bears on its inner margin a band of long setæ and a distal fringe of similar setæ, but these are much reduced in size on the outer side. The chela is strong, the palm is setose all over and well on to the base of the immovable finger. These setæ are of normal size. The fingers are inclined at a considerable angle with the palm, and are curved at the tips, especially the immovable one. Both are provided with numerous slender teeth, not very closely set, and variable in size; these teeth may be said to be large and small, but they are not disposed with any regularity.

The Palp has the normal five joints and arises at the side of the proboscis (fig. 1a). The first joint is very short and stout; the second is the longest; this is stout, dilated, curved at its distal extremity, sparsely covered with long setæ and much more abundantly with fine ones. The third joint is nearly as long, as 8 to 10, and more abundantly supplied with both kinds of setæ, which occur throughout the appendage. The fourth joint is short and richly setose; the fifth is about half as long again as the fourth, and also richly setose.

The Ovigers arise ventro-laterally, immediately in front of the first pair of lateral processes (fig. 1b). Of the orthodox ten joints the first three are quite small, the last being slightly curved, longer than either of the other two, and with an oblique termination. The fourth joint is long, the fifth is longer still, the sixth about half the length of the preceding. All these joints are covered with very fine setæ; on the first four there is an occasional longer and coarser seta, and on the fifth joint these are more conspicuous on the outer margin and distal extremity; on the sixth joint they cover it on the outer side and form a well-developed distal fringe. Of the four terminal joints the first three progressively shorten without any conspicuous difference in size; the terminal one is a little longer than the preceding, and bears a slender curved and dentate claw half as long again; there are eleven slender teeth on the claw. The denticulate spines are not numerous on these joints, 5 : 4 : 3 : 4, and are of the normal type, the shaft bearing five to seven lateral teeth. The spines on the proximal joint are the largest. (Plate X., fig. 11.)

The Legs are short and robust, only attaining a length of 17mm. Of the three coxæ the second is a little the largest; they all bear a few long setæ dorso-laterally, the

third coxa being the most deficient in this respect. The distal fringe is well developed ventrally on the second coxa, but more so on the third, and the ventral surface of this joint is covered with small setæ. The femur is short and stout, approximately equal in size to the second tibia, the first being a little longer. The setæ on these three joints are arranged in a thoroughly characteristic manner. There are two dorso-lateral rows and a lateral row, all of long, slender setæ. There is also a ventral row of comparatively short setæ, five rows in all. The setæ are much better developed on the second tibia than elsewhere. The distal fringes on these joints are normally developed; on the tibiæ they are ventral and spinous, more especially on the second tibia. The tarsus and propodus are short and much more slender than the rest of the limb. The two joints differ but little in size, the propodus being a little the longer. This bears a stout terminal claw and two well-developed auxiliaries. The setæ of these two joints are small, but have the same arrangement as on the other joints. The ventral row is, however, distinctly spinous, and a very prominent spine exists at the ventral end of the tarsus.

Only one individual of this species was taken, and its sex has not been determined.

Coulman Island, 13 January, 1902; 100 fathoms, stony bottom.

CHÆTONYMPHON BIARTICULATUM.

(Plate IV., fig. 2; Plate X., fig. 12.)

Specific characters:—

Body stout, tapering posteriorly, articulation deficient, lateral processes separated by variable intervals.

Ocular tubercle long and slender.

Palps five-jointed, proportions of last three as 3 : 1 : 1.

Oviger ten-jointed, denticulate spines not numerous, and with not more than five small teeth on each side.

Legs of moderate length, covered with rather fine setæ, terminal claw with small auxiliaries.

Body is stout and tapering posteriorly, with the lateral processes separated by a moderate interval, except the last two pairs, which are quite close together, the articulation between them being deficient. The distal extremities of the lateral processes are provided with slender spines, but these have enlarged bases and thereby become more prominent.

The Cephalon is short and stout, a very distinctly constricted neck separating the expanded portion, which forms two diverging lobes.

The Ocular tubercle lies immediately behind the neck and in front of the first pair of lateral processes. It is tall, slender, cylindrical, and bears four well-developed eyes at the extremity; there is no pigment.

The Abdomen is rather long, narrow, tapering to a blunt point, and not separated from the trunk by an articulation.

The entire body is covered with very fine setæ, not easy to distinguish, and in addition there are two long setæ dorsally near the posterior border of each segment,

two on each of the cephalic lobes, and one in the middle of each lateral process; these also possess dorsally a distal fringe of stout setæ with enlarged bases. The ventral surface appears to be quite devoid of setæ.

The length of the body is 9mm. and its width scarcely 5mm. The length of the trunk only (to base of abdomen) is 6mm.

The Proboscis is stout, cylindrical, and has a length, measured dorsally, of 3mm. It is covered with very fine but comparatively long setæ.

The Chelifori are well developed. The scape is single-jointed, reaching beyond the proboscis; it is stout and provided with rows of setæ having very stout bases and a few others as if misplaced. The distal fringe is very prominent, especially on the inner side. The chela approximately divides its length between the palm and the fingers; the former is covered with short and comparatively fine setæ, and these are continued well on to the base of the immovable finger. The fingers are inclined inwards, slender, much incurved at the tips, and furnished with a number of slender, closely-set teeth of fairly regular size.

The Palp arises laterally immediately below the chelifori (fig. 2a). The first joint is small and stout, the second is long, and extends nearly to the end of the proboscis; the third is shorter; the two terminal ones subequal and together shorter than the third, the proportions of the four joints being 5 : 3 : 1 : 1. The second joint is uniformly covered with fine setæ, as are the others. The setæ become more numerous and both longer and stiffer towards the extremity of the appendage.

The Oviger rises ventro-laterally immediately in front of the first lateral process; it consists of the normal ten joints, and is covered throughout with very fine delicate setæ (fig. 2b). Other and stiffer setæ occur sparingly on the fifth joint, more numerously on the sixth and the distal fringes of most of the joints, particularly the terminal ones. The first three joints are small, but progressively lengthen, the third having a very oblique termination. The fourth is a trifle longer than the first three together, the fifth is longer still, and the sixth is half the length of the fifth. The four terminal joints progressively shorten, the third being practically half the length of the first; the terminal one bears a slender curved claw, as long as itself, with nine slender teeth. The denticulate spines are not numerous, 7 : 5 : 4 : 4 (Plate X., fig. 12). They consist of a flattened tapering shaft with not more than five lateral teeth on each side, none of them large, and occurring nearer the base than usual, leaving the terminal portion of the shaft free. They do not appear to be much worn.

The Legs are not very long, extending to about 25mm. Most of the joints are very stout, but the tarsus and propodus are considerably reduced in diameter. Of the three coxæ the second is the largest, but not so long as the other two together; the proportions of the remaining joints are 5·5 : 6 : 5·5 : 3 : 2. The entire limb is clothed with fine setæ, but in addition to these are conspicuous rows of spinous setæ arising from enlarged bases. Two dorso-lateral rows occur on the first two coxæ, two rows occur dorsally on the femur, but here the spines are small; the two lateral rows are

much larger; but ventrally, this joint and the coxæ also are covered with normal setæ. These spines are best developed on the first tibia, two dorsal and two lateral rows being conspicuous, a ventral row of much finer spines occurs. On the second tibia all these five rows occur, but the spines are rather finer. The setæ of the two terminal joints are small without the enlarged bases, but arranged in the same manner. The terminal claw is long and slender, and is accompanied by two quite small auxiliaries. The distal fringes of the various joints do not present any unusual features.

The single specimen is a female, the Genital apertures are conspicuous on the second coxæ of all the legs.

Off the Barrier. January 27, 1902. 300 fms. Mud.

Lat. 78° 25′ 40″ S., long. 185° 39′ 6″ E.

Chætonymphon mendosum.

(Plate IV., fig. 3; Plate X., fig. 13.)

Specific characters :—

Body robust and tapering, articulation imperfect, lateral processes not widely separated, and with stout spines distally and dorsally; no fine setæ whatever.

Ocular tubercle short and stout.

Palp five-jointed, proportions of last three 5·5 : 1·5 : 1·6.

Oviger ten-jointed, denticulate spines few, with four teeth on each side, two of them prominent.

Legs with five rows of spinous setæ, without enlarged bases; terminal claw with two small auxiliaries.

This species is very closely allied to the last, but is much smaller, and presents other differences which are usually regarded as of specific rank.

The Body is robust and slightly tapering, with stoutly developed lateral processes, the intervals between which are variable, widest but not very wide between the first and second pairs; the third and fourth being quite close together, the articulation between the two posterior pairs is not present.

The Cephalon is short, anteriorly expanded into two diverging lobes; the neck is distinct, but very little constricted.

The Ocular tubercle lies behind the neck, but not clear of the first pair of lateral processes.

The Abdomen is horizontal, long, extending considerably beyond the first coxa, ovoid, tapering to a blunt point; it completely fills the space between the two posterior lateral processes. All this is in close agreement with the preceding species. The differences are :—The complete absence of fine setæ from the entire body; the ocular tubercle is rather short, stout, and slightly inclined forwards, carrying four well-developed eyes with pigment on its rounded summit; the lateral processes all provided with two or three stout spines dorsally and distally; the spinous setæ of the legs, while having the same arrangement as in the preceding species, are, on the whole, stronger in themselves, but without the enlarged bases.

The length of the body is 6·5mm., and its width just exceeds 3mm.

The Proboscis is of moderate length, 2mm., measured dorsally, cylindrical but slightly swollen in the middle; it is directed downwards, and not setose at all.

The Chelifori are well developed; the scape is single-jointed, stout, and scarcely as long as the proboscis. A row of stout spines runs along its inner border, and a few spinous setæ constitute a distal fringe, and there are two or three scattered on the shaft. The chela is strong, the palm taking up half its length, and the fingers are set at a considerable angle. The palm is covered, but not thickly, with setæ. The fingers are slender, curved towards the tip, and provided with slender teeth of fairly uniform length, but not very closely set.

The Palp rises laterally, quite close to the proboscis, and consists of the normal five joints (fig. 3a). The first is short and stout, the second is the longest of the appendage and provided with a few long setæ; its proportion to the remainder is 9 : 5·5 : 1·5 : 1·6; the third is scantily supplied with setæ, the two terminal joints are rather more abundantly supplied; the last joint is ovoid instead of cylindrical.

The Ovigers arise ventro-laterally immediately in front of the first pair of lateral processes. They comprise ten joints of normal character (fig. 3b). The first three joints are quite short, stout, and progressively lengthening; the proportions of the three following are 7 : 9 : 5. Setæ become prominent, but not numerous, on the fifth and sixth joints; on the preceding joints they are almost non-existent. The four terminal joints are small, the proportions being about 4·5 : 3 : 2·5 : 2·75, the last one possessing a curved terminal claw, quite as long as the joint, with half-a-dozen rather widely separated teeth. All the terminal joints carry a few setæ distally and dorsally. The denticulate spines are not numerous, 5 : 4 : 3 : 4 respectively; they consist of the normal flattened blade with two prominent teeth on each side, and two others of which traces remain. They are rather worn. (Plate X., fig 13.)

The Legs are rather short, about 16mm., very stout, but the tarsus and propodus are very much reduced in diameter. Of the three coxæ the second is much the longest, but not so long as the other two together. The first is provided dorso-laterally with two stout spines, and there is another rather smaller one laterally, on the posterior side. A row of spinous setæ occur laterally on the other two coxæ. The distal fringes of these two joints are ventral and inconspicuous; that of the third coxa is the best developed, and on this joint there are several small setæ ventrally in addition. The three following joints are subequal in size, the tarsus and propodus together are three-quarters the length of the preceding joint, and are themselves subequal. In these particulars this species is not in agreement with the preceding. On the two tibiæ there are two dorsal rows of stout spinous setæ, a lateral row on either side, and a strongly developed ventral row. On the second tibia the distal fringe is strongly developed ventrally, and spinous. The setæ on the femur are smaller, and only the two dorsal rows are distinct; the other three rows are present, but very feebly developed; there is a prominent distal fringe dorsally. The tarsus and propodus are similarly provided, but the setæ are much smaller. The terminal claw

is stout, not half the length of the joint that bears it, and provided with two small auxiliaries.

The specimen described above is an adult female with Genital apertures on the second coxæ of all the legs. Nearly mature ova can be seen in the femora.

It was taken in Winter Quarters, in 125fm., 24 April, 1903. Bottom : small stones, organic débris, polyzoa, shells, etc. Other specimens, generally smaller, were taken at the same place on various dates, and also at other points three and nine miles away, and at the same or greater depths, 180 fm. They all appear to be sexually mature, and differ in a varying degree from the type in their spinose character. In all cases this is more conspicuous in the males. The Genital apertures of the male are on the two posterior pairs of legs only.

The numerous minor features which separate this species from the preceding cannot, in my opinion, be ascribed to age. The form of the ocular tubercle readily separates the two.

A specimen was taken in 125 fm. on 3 May, 1903, and is, I think, a young form of this species. The differences between this specimen and the adult individuals are :—

The posterior articulation of the trunk is present, but very much less distinct than the others.

Palps : the second joint is as long as the three following together. The third joint is as long as the two terminals together, and of these the last is a little the longer.

Ovigers : these are quite rudimentary, small, and hook-like ; no joints are differentiated, though two are indicated.

Legs : the proportions of the joints differ somewhat and are, beginning with the femur, 6 : 7 : 7 : 2·25 : 3·5. The limb is clothed with comparatively strong spinous setæ of some length, not very numerous, arranged in lines.

Chætonymphon australe.

(Plate X., fig. 14.)

Nymphon australe, Hodgson (10), p. 257.
Chætonymphon altioculatum, Möbius (23), p. 181.
Specific characters :—

Body robust, with lateral processes not widely separated but divergent ; entire animal rather coarsely setose.

Ocular tubercle long and slender.

Palps five-jointed, proportions of last three as 7 : 4·25 : 4.

Oviger ten-jointed, denticulate spines fairly numerous, with four distinct lateral teeth on each side.

Legs short, tarsus a little longer than the propodus, the terminal claw with very minute auxiliaries.

Body robust, with stoutly developed lateral processes, which are distinctly though not widely separated, the interval increasing with age ; the body, exclusive of the anterior part of the cephalon, forming an oval of graceful proportions.

The Cephalon is expanded, and the space between the chelifori is marked by a deep groove, wide anteriorly. The neck is well defined, and behind this is the Ocular

tubercle, a structure which varies considerably in shape and size. As a rule it is rather stout, and bears four well-developed eyes, with a variable amount of pigment. It is slightly flattened antero-posteriorly, and more or less rounded at the extremity. The cephalon and the lateral processes are provided with several long setæ, the latter also having a distal fringe.

The Abdomen is of moderate dimensions, pyriform, and rather thickly setose, not separable from the trunk by an articulation.

The Proboscis is cylindrical, slightly enlarged about its middle. It is directed downwards, and movably articulated to the trunk. No setæ are apparent on its surface.

The length of the entire body is 8mm.; of the body only, 6mm.; of the trunk, to the insertion of the abdomen, 4·5mm. Its width is 3mm.

The Chelifori are well developed; the scape is a single joint longer than the proboscis, liberally provided with long setæ of irregular size, and also having a well-marked distal fringe. The chelæ are slender, about as long as the scape. The palm occupies half the length of the entire chela, and is covered with comparatively long setæ, which are continued far on to the immovable finger. The fingers are slender and much incurved at the tips; they are provided with a large number of closely set teeth of irregular length.

The Palps are slender and five-jointed. The first joint is quite small, the second is the largest of all, and rather sparingly provided with setæ, which are longest on its outer side; the third joint is a little shorter, slightly enlarged distally, the setæ being more numerous and more uniform than on the preceding joint. Of the two terminal joints the distal one is a little the shorter, but together they exceed the length of the second by a trifle. These two joints are richly setose, particularly on one side.

The Oviger is ten-jointed; in the female the first three joints are very small, but progressively increase in length. The fourth and fifth are subequal and much the longer of the whole series, and slightly curved in opposite directions. The sixth joint is about three-quarters the length of the fifth. Of the four terminal joints the first three progressively shorten, the terminal one being a trifle longer than the preceding, and it bears a long slender pectinate claw with eight teeth. The first four joints bear scarcely any setæ, except an inconspicuous distal fringe; on the fifth the setæ are noticeable on its outer border, and those of the distal fringe are rather long and slender. In this particular the sixth joint is similar. The four terminal joints are all provided with a distal fringe and a number of long setæ. The denticulate spines are arranged as usual in a single row, and, counting the joints from the base of the appendage, they bear respectively 9 : 7 : 5 : 7 of these spines (Plate X, fig. 15). These numbers are not, however, rigidly adhered to. The spines consist of flattened shafts of a slightly sinuous form, bearing four well-developed teeth on each side, with traces of a fifth in large and uninjured specimens. The third tooth from the base is usually the

largest. In the fully developed male the fifth and sixth joints are remarkably swollen. The enlargement of the fifth joint affects the distal half. The eggs are large, and the spherical masses may be two in number on each limb; they are carried round the fourth joint.

The Leg extends to a length of 21mm. These appendages do not differ appreciably in size. Of the three coxæ the second is much the longest, but not so long as the other two together. The proportions of the three following joints are as 4 : 5 : 4·5. The tarsus and propodus together are as long as the femur, the former joint being the longer of the two. The terminal claw is well developed, and is accompanied by two very minute auxiliaries, not one, as stated in the 'Southern Cross' Collection, Crustacea, p. 258. The entire limb is setose throughout, the setæ abundant, and variable in size, some of them distinctly spinous. For the most part their arrangement is irregular, but on the second tibia a linear arrangement begins to be perceptible, and this is clear on the tarsus and propodus, where the setæ are much finer. The distal fringe of the first coxa is dorsal, and not so strongly developed as on the two following joints, more especially the third, where it is ventral. On the femur it is chiefly dorsal, and the setæ composing it are long and stout. On the first tibia it is complete and rather spinous ventrally; this is more strongly developed on the second tibia, where there is at least one powerful spine ventrally, and generally two on each side. The male differs from the female in being more setose, the setæ being longer, more irregular, but scarcely, if any, stronger. The distal fringe of the third coxa is particularly noticeable for the great length of the setæ composing it.

The Genital apertures of the female are conspicuous on the second coxa of all the legs; those of the male are much smaller, and can only be detected on the two posterior legs.

This species was taken in considerable numbers off Cape Adare, but inside Robertson Bay, in 20–26 fm. None were taken by the 'Discovery.' I have re-described it here to remove certain defects of the original description, and on account of the capture of a form which, after considerable hesitation, I feel compelled to regard as only a variety. This species is closely allied to *N. brevicaudatum* Miers, with which *N. horridum* Böhm has been identified by subsequent investigators. *N. brevicaudatum* Miers, can be readily distinguished from *N. australe* by the following characters:—

The trunk is more setose.

The tarsus is shorter than the propodus.

The terminal claw has two distinct, if small, auxiliaries.

The oviger bears a very much smaller series of denticulate spines, but their lateral teeth are more numerous.

I am unable to regard the *Chætonymphon altioculatum* of Möbius as a distinct species, several examples of which were taken in the vicinity of Bouvet Island during the 'Valdivia' expedition.

CHÆTONYMPHON AUSTRALE, *var.* AUSTRINORUM.

(Plate IV., fig. 4 ; Plate X., fig. 15.)

Although no specimens of *Chætonymphon australe* were taken by the 'Discovery,' yet a large number of individuals of a closely allied species were taken in Winter Quarters, chiefly at the beginning of our stay there, before the ship was frozen in, and while dredging was still possible within the 20-fathom line.

At first sight these specimens seem to be a distinct species; they are half as large again or more, and their setose covering is finer. The intervals between the lateral processes are much greater, and this is the only character of importance that separates them. Another feature of doubtful value lies in the fact that the tarsus and propodus together are distinctly shorter than the femur. In *C. australe* these two joints are as long as the femur, or very little shorter, but the slight variation that occurs prevents the acceptance of this fact as a reliable specific character.

The setose covering has already been alluded to as finer; it is so, but subject to considerable variation both as to quality and quantity. In average specimens there are large spinous setæ on the tibiæ, especially on the second. These are, for the most part, arranged in a line but not very distinctly. Two dorsal rows, and a lateral row each side can be distinguished, these are most prominent on the second tibia. There may also be a mid-ventral row of very small spinous setæ, rather closely set. Both in *C. australe* and the specimens from Winter Quarters the ventral setæ of the femora and the two tibiæ are much less conspicuous than elsewhere. In many individuals there is a conspicuous mid-ventral row of setæ on the tarsus; these are closely set and about as long as the diameter of the joint.

Two specimens were taken in 100fm. off Coulman Island; of these one is comparatively small. The Ocular tubercle is rather more conspicuously flattened and very slightly constricted below the eyes. The setæ are as in the Winter Quarters specimens, but without the spinous rows which, as before noted, are not always obvious. Two other specimens were taken off the Barrier in 300fm. Lat. 78° 25′ 40″ S., long. 185° 39′ 6″ E. These are both males, one with young. In these the Ocular tubercle is flattened, as in the Coulman Island specimens, and the terminal claw of the leg is rather longer and more slender. The setose covering of the legs is very much finer, but its arrangement is exactly the same.

It is quite impossible to find a distinct character by which these specimens can be separated from *C. australe*, therefore I feel compelled to regard them as a variety only, and a more southern form of that species. Some comparative measurements are given below.

	C. australe.	*C. australe*, var. *austrinorum.* W. Q.		Coulman.	Barrier.
Length of entire body	8mm.	11	7	12	12
Length of body	6mm.	8	5·5	9·5	9·5
Length of trunk, to insertion of abdomen	4·5mm.	6	4	7	7

	C. australe.	*C. australe*, var. *austrinorum.* W. Q.		Coulman.	Barrier.
Length of abdomen	1·5mm.	2	1·5	2·5	2·5
Width of trunk	3mm.	4	3	scarcely 5	scarcely 5
Length of third leg	21mm.	31	18	32	37
Proportions of femur and two tibiæ .	4 5 4·5	6 7·75 7		6 9 8	7 9 8·5
		3·5 4·5 4			
Tarsus and propodus together . .	As long as femur, or very nearly.			Shorter than femur	

In all cases the tarsus is longer than the propodus.

The Palps are alike in all cases, but these have not been accurately measured, as this cannot be done without removal.

Fig. 4a is that of a Winter Quarters specimen.

The Ovigers are essentially alike, the differences between one or two of the joints being very trivial (fig. 4b). The number of denticulate spines is too irregular to be of any value.

♀ 9 : 7 : 5 : 7. ♀ 11 : 7 : 5 : 8. ♂ 11 : 9 : 7 : 9.

The character of these spines is shown in Plate X., fig. 15.

The sexual difference in these organs is the same in all, and the ova, which are known in all but the Barrier specimens, are large and attached to the oviger in precisely the same way.

PENTANYMPHON.

Body smooth, very slender, with lateral processes widely separated. Five pairs of legs. Chelifori well developed, chelate ; scape a single joint. Palps five-jointed.

Ovigers ten-jointed, terminating in a pectinate claw, the last four joints with a single row of denticulate spines.

But for the additional pair of legs it would be quite impossible to separate this genus from *Nymphon.* Only a single species is for the present recognised, and this appears to have a circumpolar distribution. It has been taken by the Scotch, German, and French Expeditions.

Pentanymphon antarcticum.

(Plate V.)

Pentanymphon antarcticum, Hodgson (11), p. 458 ; Cole (7), p. 405 ; Bouvier (3), p. 294.

Specific characters :—

Body very slender, lateral processes long and widely separated, neck very long.

Chelifori : chelæ long and slender, shorter than scape, with short, stout, uniform, close-set teeth.

Palps : terminal joint longer than preceding, which is in turn half the length of the third.

Ovigers : terminal claw pectinate, denticulate spines, with seven pairs of lateral teeth, the first being very small.

Legs rather long and slender, with a well-developed terminal claw and two auxiliaries ; setæ arranged in four rows on the last three joints.

The body is very slender, quite smooth, with very widely separated long lateral processes. Anteriorly it is slightly curved downwards.

The Cephalon is long and slender, longer than the second and third segments, and expanded distally into two dorsal lobes for the articulation of the chelifori.

The Ocular tubercle lies immediately in front of the first pair of lateral processes. It is short, merely a low rounded hump, in fact, bearing four well-developed eyes.

The Abdomen is very small, directed upwards, and not separated from the trunk by an articulation. It is rather conical and extends but little beyond the trunk, not nearly so far as the posterior lateral processes.

The segmentation of the trunk is distinct, the joints occurring immediately behind the lateral processes.

The Proboscis is directed downwards, cylindrical, with a slight swelling about the middle of its length; it is as long as the cephalon, and its extremity is rounded.

The Chelifori arise above the proboscis, each on a lobe of the cephalon, which is here rather more than twice its diameter posteriorly. The scape is single-jointed, longer than either the proboscis or the chela. A few delicate setæ are scattered along its length, and there is an inconspicuous distal fringe. The chela is a little shorter, the palm and dactyli occupying equal halves; the former is covered with fine setæ which also form a fringe round the base of the movable finger. The fingers are slender and much curved near the tips. Both are provided with a row of fairly stout teeth of nearly uniform size, rather closely set.

The Palps arise below the chelifori and at the sides of the proboscis; they are built on exactly the same plan as in the genus *Nymphon* (fig. 1a). The first joint is small and stout, the proportions of the remainder being 8 : 5 : 3 : 4. The second joint is sparingly setose except for a distal fringe; the other joints become more and more setose to the last, which is richly supplied. On the outer side they are more abundant than elsewhere.

The Ovigers are ten-jointed and present in both sexes. (Fig. 1 b.) They arise from very short but conspicuous processes on the lower side of the cephalon, immediately in front of the first pair of lateral processes. The details of this appendage are as in *Nymphon*. The first joint is very small, the second is twice the size, and the third, which has a very oblique termination, is a little longer still; none of these bear setæ. The fourth joint is very long, slender, and slightly curved; it carries a glandular aperture on its outer side about a quarter of its length; all the setæ are small; very few occur except as a distal fringe. The fifth joint is longer still, the longest of the appendage, and its distal half is enlarged in diameter; it is covered throughout with fine setæ. The sixth joint is rather more than half the length of the fifth, slightly curved, and on the outer side of the curve plentifully supplied with fine setæ. Of the four terminal joints the first is little more than half the length of the preceding, the other three are shorter and sub-equal; very few setæ occur, except distally. They carry a single row of denticulate spines (fig. 1c). These

spines consist of a slender shaft with a swollen base; near the base is a pair of small teeth followed by two pairs of comparatively long slender ones; the remaining four pairs are more slender and blade-like, graduating to a mere trace. The terminal claw is furnished with about nine slender teeth. Both denticulate spines and terminal claw are frequently very much worn.

With regard to the Legs, all five are practically of the same size and proportions, and though there is a considerable amount of variation in this respect it is confined to narrow limits. They may attain a length of as much as 36mm. Of the three coxæ, the first and third are sub-equal and together about as long as the second; all, especially the third, bear a few minute setæ, chiefly ventral. The proportions of the three following joints are approximately as 6·5 : 7 and 10; the tarsus and propodus are long and slender, the former being the longer. The limb is more or less covered with fine setæ. On the femur they are scanty and for the most part small; a few longer ones are to be found along the shaft and distally. On the first tibia they are comparatively long and arranged in four indistinct rows, of which the lateral ones are not easy to observe. On the second tibia they become smaller and much more numerous, especially distally, and the distal fringe is strongly developed ventrally. The same arrangement holds good for the two remaining joints, but the ventral row is very strongly developed, the setæ becoming almost spinous and closely set. The terminal claw is a powerful one, and is accompanied by two slender auxiliaries of about quarter its size.

The Genital apertures of the female are found on the second coxæ of all the legs and in the adult they are distinct enough. The apertures of the male are at all times difficult to observe, and I have only been able to distinguish them on the three posterior pairs of legs.

Nearly thirty specimens of this species were taken in Winter Quarters, at all times of the year, and in depths ranging from 12 to 125 fathoms. They vary considerably in size, a variation obviously due to age, but in essential details they are in agreement except in one particular, and that is the articulation of the abdomen to the trunk; in certain cases among the more robust forms it is distinctly articulated. The trunk in all cases is seen to be very minutely scabrous when removed from spirit. The females are more robust than the males when the sexes can be separated, a feature which is most noticeable in the femora, but extends to the first tibiæ. The males, as a rule, are rather more setose than the females.

A few of the eggs borne by one of the males are hatched. On emerging from the egg the body is ovoid, and possesses three pairs of appendages. The cheliforus comprises a stout scape with one very long seta, and a small but well-developed chela, without teeth on the dactyli; a small proboscis lies below these. Details of the other two pairs of appendages cannot be seen without special preparation, which has not as yet been undertaken. Other specimens crawling about the egg-masses show the proboscis, chelifori, the palps not clearly jointed, and four pairs of appendages, having

three stout sub-equal joints, followed by a fourth nearly as long as the three together, only a great deal more slender, and terminating in a very minute claw; a conical abdomen lies at the extremity of the trunk, the posterior part of which is provided with a small number of very long setæ.

LEIONYMPHON.

Prof. Möbius (23) has described this genus as follows:—

"Körper kurzhaarig. Rumpf breit. Beinträger am Grunde zusammenstossend. Hals kurz und breit. Augenhügel konisch mit 4 Augen. Rüssel walzenförmig. Finger ohne Zähne. Palpen neungliedrig. Brutbeine zehngliedrig, 7. Glied beim Männchen kurz und dick; alle Glieder nur kurz behaart."

LEIONYMPHON, *n.g.**

Rumpf ebenso breit wie lang. Die beintragenden Seitenforsätze der Rumpfglieder stossen zusammen. Kopfsegment breit. Augenträger konisch.

Rüssel walzenförmig. Scheren kurzer als der Rüssel. Finger ohne Zähne. Palpen neungliedrig.

Brutbeine zehngliedrig ohne eigentümlich geformte Dornen oder Zähne an den 4 letzen Gliedern. An den männlichen Brutbeinen ist das 7. Glied sehr kurz, aber viel dicker als die andern 3 Endglieder.

This genus was established for the reception of a remarkably fine species, *L. striatum* (Möbius), of which however only two examples were taken, and both of them immature. A species in the same collection described by Prof. Möbius as *Colossendeis gibbosa* appeared to me to be closely related, and an examination of the two species which I have been permitted to make fully confirmed this suspicion. The 'Discovery' has brought from the Antarctic several species which are unquestionably very closely related. The 'Français' (2) has also found two species. Two more were described some years ago by Dr. Pfeffer (24), from South Georgia, and placed by him in the genus *Ammothea.*

That the genus *Leionymphon* is very closely related to *Ammothea* is beyond all question. To this latter genus not less than thirty species have been ascribed, but many of them present such peculiar characters that they cannot fairly be included. It is not possible here to revise the genus, but I have considered it desirable to modify Prof. Möbius' definition of the genus *Leionymphon,* and to give a list of those species which I consider should be included therein.

LEIONYMPHON.

Body more or less robust, with transverse ridges developed to a greater or less extent. The lateral processes widely separated or otherwise; spurs rather than spines, or traces of them, occur on the lateral processes and first coxæ.

The Proboscis is large, cylindrical or pyriform.

The Palps are nine-jointed, the last five joints being short.

* "λεῖος glatt. Die 4 letzten Glieder der Brutbeine sind nicht mit eigentümlich geformten Zähnen oder Dornen besetzt."

The Oviger is ten-jointed, without a terminal claw, the last four joints with an irregular series of special spines. In the male, the seventh joint bears a tuft of setæ, and the eighth and ninth joints are articulated at a considerable angle to the preceding joints.

The Legs are long, tarsus very small, propodus armed proximally on the ventral margin with a series of stout spines, claw rather large, and accompanied by two well-developed auxiliaries.

The Genital apertures occur in the male on the two posterior pairs of legs; in the female on all the legs.

The species I would assign to this genus are :—

L. striatum, Möbius, 1902.
L. grande, Pfeffer, 1889 = *Ammothea grandis*, Pfeffer.
= *Ammothea charcoti*, Bouvier.
L. gibbosum, Möbius, 1902 = *Colossendeis gibbosa*, Möbius.
L. minus, sp. nov.
L. clausii, Pfeffer, 1889 = *Ammothea clausii*, Pfeffer.
L. australe, sp. nov.
L. glaciale, sp. nov.
L. spinosum, sp. nov.

I have hesitated for some time as to the position of *Ammothea magniceps* (Thomson) from New Zealand (30). Mr. G. M. Thomson most kindly placed the whole of his collection at my disposal, but unfortunately it does not contain an adult male of this species, therefore the structure of the male oviger remains unknown. The transverse ridges of the trunk are prominent, but there is no trace whatever of the spurs so characteristic of *Leionymphon*. Under any circumstances, the species cannot be regarded as a true *Ammothea*. (Mr. Thomson is in error in describing the palp as with ten joints, there are only nine.) Be the true position of this species as it may, it exhibits a preliminary stage in the transition between the diminutive *Ammothea* and the large *Leionymphon*. The next step is indicated by *L. clausii* and *L. australe*; these two species are very much alike; from these by *L. minor*, *L. gibbosum*, and *L. grandis* to *L. striatum*. It would be difficult to give *L. glacialis* and *L. spinosum* a position in a linear series. They probably diverge from *L. striatum* in a different direction to the others.

KEY TO THE SPECIES.

Body traversed by three prominent pyramidal ridges, spinose or setose :—
  Lateral processes close together—
    *Proboscis half as long as body, cylindrical. *L. striatum.*
    Proboscis little longer than body, cylindrical. *L. grande.*
    *Proboscis as long as body, conical. *L. gibbosum.*
    Proboscis shorter than body, slender, pyriform. *L. minus.*
  Lateral processes widely separated—
    Proboscis little shorter than body. *L. glaciale.*
    Proboscis short, not half length of body. *L. spinosum.*
Body traversed by three rounded ridges, smooth :—
  Abdomen vertical, base traversed by the last trunk articulation. *L. clausii.*
  Abdomen oblique, some distance behind the last trunk articulation. *L. australe.*

* Known only from immature examples.

Leionymphon grande.

(Plate VI., fig. 1.)

Ammothea grandis, Pfeffer (24), p. 43.
Ammothea charcoti, Bouvier (2), p. 295.

Specific characters :—

Body robust, with three prominent transverse ridges dorsally and ventrally.

Proboscis cylindrical, very little longer than the body.

Palp 9-jointed, the last joint a little longer than any of the four preceding ones.

Oviger 10-jointed, without a terminal claw, the last four joints with simple curved spines, which increase in size to the extremity of the last joint.

The body is stout, and with the abdomen, scarcely as long as the proboscis, being just less than 15mm. Its width across the second pair of lateral processes is 10mm. Its segmentation is complete, but concealed by a very strongly developed pyramidal ridge which lies along the posterior margin of the three anterior segments, and the apex of which is raised considerably above the body level. These ridges have a very slight curvature forwards, which is most marked in the first. The lateral processes are not widely separated, the two anterior pairs are directed forwards, the first more than the other, and are quite close together; the third pair is directed backwards slightly with a wider interval between it and the preceding pair; the last pair is directed backwards at such an angle as to make the interval between the third and fourth pair very conspicuous. All have a swelling at the distal extremity, and this swelling gives the process an angular appearance.

The Cephalon is short, expanded anteriorly, and at the base of the chelifori presents the same angular appearance as the lateral processes. A slight median groove divides its anterior margin.

The Ocular tubercle lies in the middle; it is stout, with a very slight curvature, rounded at the apex, and bearing four well-developed eyes.

The Abdomen rises from the extremity of the trunk, but without trace of segmentation; it is rather stout, slightly curved, and directed upwards. There is a median tubercle between the posterior transverse ridge and the abdomen. Dorsally the entire body is rendered scabrous by the presence of small spinous setæ; between the body ridges however they are scarce. Ventrally the three transverse ridges of the dorsum are represented by three similar ridges, thinner and not produced to such a conspicuous point; all are directed backwards to a varying degree, the first more so than the others. These ridges are continued on to the base of the lateral processes, which here do not present any trace of the angular enlargements so conspicuous dorsally. The spinous setæ of the dorsum are not present.

The Proboscis is stout and cylindrical, only a trifle longer than the body and abdomen together. It is articulated to the body, and movable through a very considerable angle. The mouth is large and triangular. The distal extremity of the organ is deeply pigmented; for nearly three-quarters of its length it displays six

bands of a dark yellowish-brown colour; it then abruptly changes colour, and tapers a little to its junction with the body.

The Chelifori are rudimentary, and arise from the cephalon dorsal to the proboscis, and rather in advance of its origin. The scape is short and stout, slightly curved, and with the distal extremity oblique. Articulated to it is a mere knob which bears at its extremity a minute tubercle in a distinct socket, and on its outer border a small spine. The entire appendage is covered with minute spinous setæ.

The Palps are nine-jointed, and arise from the cephalon immediately below and external to the chelifori. The first joint is small, and the second is very nearly four times as long, the third is again small, and the fourth nearly twice as long as the second. The remaining five joints are together but little longer than the fourth, and differ but little in size; the terminal one, however, is the longest of this series. The entire appendage is covered rather irregularly with the characteristic small spinous setæ of the animal. They are not numerous on the proximal four joints, but on the remaining five they are rather longer and finer, as well as being a little more abundant.

The Ovigers are ten-jointed, and arise ventrally at the angles formed by the first pair of lateral processes and the body. All the joints are small, the second and fourth being a little the longest (fig. 1a). The first joint is very small but stout, the second and fourth are the longest and sub-equal, the third is shorter and slightly curved. From the fourth the three following joints progressively decrease a little in length, the first three forming a curve in the natural position of the appendage. All these joints are stout, the three terminal ones becoming more and more slender; the eighth joint, though more slender, has the same character as the preceding, the ninth is a little shorter, and the last one is the longest of the four terminals. The entire limb is covered, but not thickly, with small setæ; they are most numerous on the fourth, fifth, and sixth joints, on the latter of which they are conspicuous only on the outer side of its curvature. The remaining four joints form a curve in a contrary direction, and on the inner side of this curve is a row of stout curved setæ, increasing in size and strength to the end of the terminal joint, where they form a conspicuous group. These spines are quite simple, and the last joint does not bear a claw, though it seems adapted for one.

The Legs are stout but not of any excessive length, being something like 62mm. The second coxa is fully as long as the other two together, and the proportions of the remaining joints are as—15 : 13 : 17 : 1 : 5. The first coxa is marked with a median dorsal and ventral line which separates the muscles moving the succeeding joint, the distal margin is tuberculated dorsally like the lateral processes, but only to a very slight extent; the second coxa is conspicuously wider in diameter at its distal than at its proximal extremity. All three are covered with very small but stout setæ. The femur is a stout joint, its distal extremity being raised dorsally into a slight angular ridge; the entire joint is covered with the characteristic setæ with the exception of a

lateral band of some width, almost completely bare of them. On the two tibiæ the same arrangement of the setæ occurs, except that along the middle of the bare band there is a narrow band of setæ two or three wide. The distal fringes of the femur and first tibia are not conspicuous, but that of the second tibia is formed of stout spines chiefly on the ventral surface. The tarsus is a very small joint, and forms a cup-like socket for the propodus (fig. 1b); it is thickly covered with small spines, and its distal fringe is well developed, especially ventrally, where it is formed of very stout spines. The propodus is covered thickly with stout setæ with only an irregular vestige of the bare band found on other joints; it is slightly curved, and its ventral side bears proximally four or more very stout spines, of which the first is the smallest; the rest of the margin is taken up with setæ small, but larger than the average; close to the terminal claw is a group of large setæ, one of which at least is a rather prominent spine. The extremity of the joint is oblique, and forms a rounded spinose projection or heel beyond the origin of the stout claw, which, with its two powerful auxiliaries, arise from a common investment.

The single adult specimen captured is a female, and the Genital apertures are conspicuous on the second coxa of each leg. Five smaller specimens were, however, taken at the same time and place, varying in size from 9·5 mm. to 18·5 mm. over all. These present several differences of no small importance. The proboscis differs slightly in form, being more tapering the smaller the specimen, and it is also more rigidly articulated to the body; in none of them is it movable through so large an angle as in the adult. The chelifori are proportionally the same size as in the adult, but a perfect chela is developed. This is small and feeble, the fingers curved like a pair of callipers, and devoid of teeth. On the body the dorsal ridges are raised into a more definite median point, and the tubercles which give an angular appearance to the lateral processes and first coxæ of the adult are now rather more prominent and carried on to other joints. The pre-abdominal tubercle is a very variable structure, and is sometimes prominent—in one case almost absent. The palps do not call for any fresh description, but the ovigers show several interesting stages in their development (figs. 1c–1f). In the smallest specimen only the merest vestige of such an appendage exists. In the next specimen four joints as such may be distinguished, the last one showing an indication of future segmentation. In another, six joints are fairly well established, the penultimate one showing traces of another division. In the largest of the immature specimens the oviger possesses the full number of ten joints, but they are very small, and the four terminal ones are only indicated and not clearly developed.

Cape Wadworth, Coulman Island, 8–15 fathoms. Bottom: stones. Several adult specimens were taken by the 'Français' off the west coast of Graham's Land, and one was taken by the 'Scotia.' The examination of Professor Pfeffer's *Ammothea grandis* from South Georgia has established the identity of this species beyond all question.

LEIONYMPHON MINUS.

(Plate VI., fig. 2.)

Specific characters :—

Body rather robust, with three prominent transverse ridges produced to a point in the mid-dorsal line.

Proboscis shorter than the body, slender, pyriform.

Palp 9-jointed ; the terminal joint twice as long as any of the preceding four.

Oviger 10-jointed. In the male the three terminal joints bear an irregular series of stout but simple spines. No terminal claws.

The body is rather robust and the lateral processes are clearly but not very widely separated. It measures rather less than 5 mm. in length and less than 4 mm. in extreme width. The segmentation is distinct, and the articulations lie at the hinder part of the three transverse ridges which cross the body. These ridges are strongly developed, produced to a point in the middle line, and slightly curved backwards. They are equally prominent ventrally, but inflected backwards and not produced into a point. The lateral processes are stout, the two anterior being directed forwards at slightly different angles, the two posterior ones are similarly directed backwards ; each bears dorsally two distinct tubercular processes which are also to be found in a less prominent degree on the first coxæ.

The Cephalon is scarcely, if at all, expanded, and its centre is occupied by a very stout Ocular tubercle which is directed slightly forwards, and appearing, in certain aspects, to be enlarged near its extremity, which bears a very rudimentary spine. The four eyes are not particularly well developed.

The Abdomen is short and stout, not separated from the trunk by an articulation ; it is directed obliquely upwards and does not extend as far backwards as the last pair of lateral processes.

The Proboscis is pyriform, slender, and about two-thirds the length of the body, to which it is flexibly united. It shows indistinctly three pairs of longitudinal bands along the greater part of its length.

The Chelifori are rudimentary ; the scape is well developed, slightly curved, and bears only a few small setæ besides the rather prominent distal fringe. The chelæ are reduced to a knob with the merest traces of fingers.

The Palps are 9-jointed and rise at the side of the proboscis ; the first and third joints are quite short and subequal, the second and fourth are also subequal and about five times as long ; the four following are quite short and subequal, while the terminal one is ovoid and twice as long as any of the preceding four. The fourth joint bears a small distal fringe, but otherwise there are practically no setæ on the first four joints ; the following four joints are very considerably dilated ventrally, and this enlargement bears a dense tuft of small stiff setæ. The terminal joint is more extensively covered with setæ, especially on its ventral side.

The Ovigers are 10-jointed and rise ventrally just in front of the first lateral

process (fig. 2a). The first joint is small and stout, the second is more than twice as long, stout and enlarged distally, the third is scarcely as long and has an oblique termination. These three joints form a curve in one direction, and the three following form a similar curve in another. The fourth and fifth joints are long and subequal, the sixth being about half the length of either; its termination is rounded, the following joint being articulated at the side. All these joints are more or less plentifully setose; the setæ are very small, but their structure and arrangement call for no comment. The seventh and succeeding joints progressively decrease in length and stoutness as far as can be made out from the angle at which they lie, and they are all small. The seventh lies at right angles to the sixth, and near its distal and inner side it bears a dense tuft of long setæ. The eighth joint is articulated at the side of the seventh and at right angles to it; it also bears a small tuft of long setæ near its distal extremity but on its outer side; the following joint is similarly provided, but with fewer. The last three joints bear an irregular series, not a single row, of stout spines (fig. 2c); most of them occur on the terminal joint, but there are scarcely a dozen altogether. There is no terminal claw.

The Oviger of the female is essentially different to this (fig. 2b). All the joints are smaller, the third conspicuously smaller than the preceding, and the fourth, though the longest of the appendage, is still quite short, and the remainder gradually and progressively decrease in length. Up to the sixth the joints remain stout, the rest are much more slender, and there is nothing noteworthy in their articulation, which is quite normal. The sixth joint is thickly covered on its outer side with minute setæ, and up to this joint the setæ have been increasing in number. The terminal joint is unfortunately missing in the specimen examined, but the three preceding are almost devoid of any setæ at all.

The Legs measure about 28 mm. in length. The second coxa is scarcely the length of the other two together, the femur measures some 7 mm., the first tibia is the merest trifle shorter, the second a little longer, 7·5 mm., the tarsus and propodus together are about one-third the length of the second tibia. The second coxa bears a small but distinct tubercular enlargement just beyond the middle of its length dorsally, and in the male there is a similar tubercle dorsally near the extremity of the femur, with a glandular aperture upon it. The entire limb is setose, but the setæ are very small; no definite arrangement can be seen as far as the first tibia, up to this joint they are not numerous and only visible with difficulty. On the tibiæ they become numerous; on the first their arrangement is indistinct, on the second it is more readily made out, and consists of a dorsal and a ventral band of setæ with another narrow band passing along the centre of a bare space laterally. The distal fringes are but poorly developed, the most conspicuous one being on the second tibia and chiefly ventral. The tarsus is a very small cuplike joint, densely setose on its longer and ventral margin. The propodus is slightly curved and dorsally projects considerably beyond the insertion of the large terminal claw and its strong auxiliaries. The joint is thickly covered with stout

setæ on its ventral surface, and proximally there is a row of some four to six very strong spines; dorsally the setæ are similar, but not so thickly distributed nor so strong; laterally also they occur, and there appears to be a narrow band devoid of setæ, but this is not distinct. The terminal claw and its auxiliaries arise from a process on the ventral side of the prolongation alluded to above.

The type of this species is an adult male bearing eggs, taken in Winter Quarters at a depth of 125 fm., 9 Feb., 1903. Another was found at a depth of 35 fm., 5 March, 1903. The ova are small and are carried in a large, rather irregular mass round the fourth and fifth joints of the oviger. The Genital apertures occur ventrally at the distal extremity of the second coxa of the two posterior legs. They are large, with tumid lips. Genital apertures of the female are on all the legs. A male and a female were also taken off Cape Wadworth, Coulman Island, in 8–15 fm., 15 Jan., 1902. These are smaller than the type.

Leionymphon australe.

(Plate VII., fig. 1.)

Specific characters :—

Body robust, with three low rounded transverse ridges; these ridges are more prominent ventrally. Abdomen directed obliquely upwards, and well behind posterior trunk articulation.

Proboscis pyriform, little shorter than the body.

Palp 9-jointed, the seventh and ninth being a little the longest of the five terminal joints.

Oviger 10-jointed, without a terminal claw, the last four joints with an irregular series of denticulate spines.

The body is robust and, without taking the lateral processes into consideration, broadest about the third process, from which it gradually narrows forwards.

The Cephalon is but slightly expanded and the neck is not distinct. The entire body measures 9 mm. in length, of which 4 mm. are taken up by the proboscis; the Abdomen does not enter into consideration, as in its natural position it is carried obliquely upwards, and does not extend beyond the last pair of lateral processes; it is, however, $1\frac{1}{2}$ mm. long. Segmentation is distinct, except so far as regards the abdomen, and occurs on a low ridge which crosses the body immediately behind the lateral processes. These ridges also occur ventrally and, being reflected backwards, give to each segment the appearance of being socketed into a recess. The lateral processes are not widely separated, but the intervals increase slightly from before, backwards; all are provided at their distal extremities with two small spur-like processes; these are dorsal.

The Ocular tubercle is stout, moderately tall, rounded at the apex, and bears four well-developed eyes.

The Proboscis is movably articulated to the body and pyriform in shape, its diameter increases for more than a third of its length, and then enlarges abruptly, and is marked by three double bands, presumably muscle bands, transversely divided near the tip. The mouth is triangular, not large, but with thick lips.

The Chelifori are rudimentary and comprise a stout scape of one joint, which is slightly curved; except for a distal fringe which is not conspicuous, the joint is not setose. The chelæ in the adult are only represented by knobs, and these show the merest traces of two fingers. In younger specimens the chelæ are developed and exhibit comparatively long curved fingers devoid of teeth.

The Palps are nine-jointed and arise at the side of the proboscis. The first joint is short and stout, the proportions of the three following are as 5 : 1 : 4; the remaining five are all short and differ little in size, the first and third are sub-equal, the second and terminal are very little shorter but also sub-equal, the penultimate is the shortest; the last joint is ovoid in shape, setose throughout, the setæ more thickly distributed on its inner margin. The other four joints have slender bases and are much enlarged and densely setose on the inner margin; the outer margin is straight and bears a distal fringe. The preceding joints are also more or less setose, the short setæ beginning near the distal extremity of the second joint and becoming fairly numerous on the fourth.

The Ovigers are ten-jointed and arise ventro-laterally immediately in front of the first pair of lateral processes; they differ in the two sexes. In the male (fig. 1a), the first joint is small and stout, and the proportions of the five following are as 4 : 2·3 : 4 : 4 : 2; the first of these, second of the appendage, is slightly curved; the next is less so, but with the three following forms a large curve, the fifth joint being the only one that is distinctly curved itself. All these joints are setose, particularly on the outer side of the curvatures. The four remaining joints are short; the seventh is articulated at the end of the sixth, but at the side, and makes nearly a right angle with it; near its distal extremity it is provided with a dense tuft of long setæ. The eighth joint is similarly articulated to the seventh, but in the opposite direction, and bears a smaller tuft of long setæ distally; the ninth is the shortest joint. The three terminal joints bear a small number, less than a dozen, of denticulate spines, most of which occur on the terminal joint. They are not in a single row, and consist of a slender shaft with seven closely-set flat teeth on each side.

The oviger of the female is quite different and the articulation of its joints is normal throughout (fig. 1b). The first and third joints are together equal to the second; the fourth and fifth are sub-equal, and the longest on the appendage; the sixth and seventh are a little shorter and sub-equal, the eighth and tenth are again shorter and sub-equal, and the ninth still shorter. Setæ are scarce, and the sixth joint is the only one that can be described as setose. The denticulate spines occur on the four terminal joints, and are exactly like those of the male, but much more numerous, there being upwards of a dozen on each of the joints except the first of the series.

With regard to the Legs, the second coxa is scarcely as long as the other two together; the proportions of the three following joints are as 6·5 : 6 : 7·5;

these joints are subject to variation, but not of great moment, ·5 mm. or thereabouts; the tarsus is quite small and cup-shaped, the propodus rather more than a quarter the length of the second tibia. The entire limb is covered with short setæ, but on the second tibia and the propodus there are longer ones interspersed among them. Throughout the entire limb there is a broad lateral band devoid of setæ except for a narrow row of them along its centre; dorsally and ventrally the setæ are abundant, particularly towards the extremity of the limb. The distal fringes are normal and inconspicuous, *i.e.*, indistinct on the first coxa, ventral or chiefly so on the other two, complete on the femur; on the two tibiæ they are best developed ventrally, and become spinous, especially on the second; the tarsus is covered with small spines or spinous setæ ventrally, the propodus has a very prominent heel and bears a stout claw with two well-developed auxiliaries rather more than half its size. The heel bears numerous spinous setæ, and at the proximal end of the joint on its ventral margin there are some half-dozen stout and prominent spines.

The Genital apertures occur on the second coxæ of all the legs in the female, but they can only be found on the two posterior legs of the male. The ova are small and numerous and are carried in a spherical packet round the fourth joint of the oviger.

Several specimens of this species were taken in Winter Quarters at depths varying from 25 to 125 fms., the majority however coming from the latter depth. The specimens vary in age and size, but the species may be regarded as a variable one. While the general arrangement of the setæ remains the same it is not so clear in the young examples. In these the setæ are for the most part long and fine instead of short and comparatively stout; the transition from the one form to the other is gradual, some of the adults retain a goodly proportion of the long setæ among the others. A very few minute setæ may be found on the body in some individuals, especially on the abdomen. In most individuals the summit of the ocular tubercle bears a very short spine instead of being rounded. In the young the chelæ are fairly well developed, they are of moderate size, the fingers being quite smooth and resembling a pair of callipers. The spur-like tubercles on the lateral processes of the adult are, in the young, very prominent spines and frequently bifurcated; similar spines occur on the cephalon. One specimen has the oviger not completely developed and in another the full number of joints is not yet differentiated.

All the adults possess a glandular aperture of some kind on the dorsal surface of the second coxa just beyond the middle of its length.

One individual has the second and third legs of the left side abnormally developed, probably new growths in reparation of injury; one of these limbs does not extend beyond the extremity of the first tibia, the other is longer.

This species very closely resembles *L. clausi* Pfeffer, but may be readily

distinguished by the fact that in that species the abdomen is directed almost vertically upwards, and is situated so far forward that the posterior trunk segment passes over its base, a feature of, possibly, some morphological importance.

Leionymphon spinosum.

(Plate VII., fig. 2.)

Specific characters :—

Body stoutly built, with the transverse ridges not very strongly developed, but with a very prominent spur in the mid-dorsal line. The lateral processes are rather widely separated, and bear distally two stout recurved spurs ; smaller ones exist on the first coxæ.

Proboscis short, not half the length of the trunk.

Palps 9-jointed ; of the five terminals the seventh and ninth are a little longer than the others.

Oviger 10-jointed, special spines not denticulate.

The entire animal is heavily built, and covered with fine but short setæ. The lateral processes are rather widely separated, the intervals increasing posteriorly, two pairs of processes are directed more or less forward, the other two pairs backward. Each process bears dorsally at its distal extremity a pair of prominent recurved tubercular processes ; these are also distinct, though less prominent, on the first coxæ. The body is crossed transversely by three ridges, but these do not extend on to the lateral processes as much as in the allied species. These ridges stand erect, but they are bevelled from behind in the middle line so as to form an acute point of some considerable elevation, and this gives them the appearance of being arched forward.

The Cephalon is not very much expanded, and almost fills the interval between the first pair of lateral processes ; in front it bears a pair of tubercular processes directed outwards, one at the base of each of the chelifori.

The Ocular tubercle is just behind the centre of the cephalon and is very stout, taller than any of the transverse ridges, and terminates in a cone above four well-developed eyes.

The Abdomen is not separated from the body by an articulation ; it is of normal proportions, elongate, ovate and directed slightly upwards.

The entire body is covered with short, fine setæ, but they appear to be deficient between the ridges, and to some extent on the cephalon. Ventrally the transverse ridges are rounded, and the median spur much less prominent than dorsally ; the setæ also are deficient. The length of the body is 13 mm., and its extreme width is 8 mm.

The Proboscis is short and stout, being barely 5 mm in length, cylindrical, slightly swollen in the middle, and movably articulated to the body.

The Chelifori are rudimentary, they lie close together above the proboscis and are more than half its length. The scape is half the length of the proboscis, very slightly enlarged distally and clothed with short setæ ; the chelæ are only knobs, also setose, and with but vestiges of the fingers.

The Palps rise laterally below the chelifori and comprise nine joints (fig. 2a). The first joint is short and stout, the proportions of the various joints being : 1·5 : 4 : 1 : 3·5 : 1 : 1 : 1·3 : 1 : 1·5. The entire appendage is covered with fine setæ which become numerous on the fourth joint ; on the four following joints they form a dense patch covering the

whole ventral surface, and extending dorsally in a very small degree on the first of these joints but progressively more and more as the extremity of the appendage is approached. The terminal joint is completely covered, but they are most abundant ventrally.

The Ovigers are ten-jointed and rise ventrally in the angle formed by the cephalon and the first lateral process (fig. 2b). The first six joints form the normal double curve and are all more or less covered with small setæ on the outer part of the curvatures. The proportions of the various joints are : 1·5 : 3·25 : 2 : 3 : 3 : 2 : 2 : 2 : 1·5 : 2. The last four joints are provided with a few large spinous setæ forming, on three of the joints, a small irregular group ventrally near the distal extremity ; on the terminal one, which is much the most slender, they are scattered along its length, one of them taking the place of the terminal claw.

The Legs are not all the same size, the third pair being the longest and the first the shortest, their respective lengths being approximately 30 mm., 35 mm., 39 mm., 37·5 mm. The third leg of the right side has been measured. Of the three coxæ the second is longer than either of the other two, the three together attain a length of 8 mm., and the proportions of the other joints are as 9·25 : 9 : 8 : 3·5, the last figure representing the tarsus and propodus together. The entire appendage is densely clothed with rather short but fine setæ having no special arrangement, except that on the femur and first tibia they are not so numerous laterally. The tarsus is small, cuplike, densely setose, but with no strong spines. The propodus is slightly curved, densely setose, and with an oblique termination to the joint, but the process from which the large terminal claw and its two moderate-sized auxiliaries arise projects beyond the joint itself. The ventral margin of the propodus is spinose but varies greatly. In the best instance there is a series of eight spines, the first four are small and then they increase in size rapidly to the last, which is very large. These occupy the proximal half of the joint. Then follows another series of six of nearly uniform size and not so large as the biggest of the previous series. This second series occupies the remainder of the joint and are disposed radially. In other cases the first series is not so well developed and the second is deficient.

The single specimen of this species is an adult female, the Genital apertures are found near the middle of the second coxæ of all the legs.

Taken in 300 fathoms off the Barrier. Bottom : mud. January 27, 1902.

Leionymphon glaciale.

(Plate VII., fig. 3.)

Specific characters :—

Body well built, with three very prominent transverse ridges produced to a point in the mid-dorsal line. Lateral processes rather widely separated, and with the stumps of spur-like processes distally.

Proboscis large, but shorter than the body, pyriform.

Palps 9-jointed, the five terminals being sub-equal in size.

Oviger 10-jointed (not mature).

This is a large and comparatively slender species.

The Body is well built with the lateral processes rather widely separated, and traversed by three very prominent pyramidal ridges which conceal the segmentation. These ridges are directed backwards to a very slight extent and excavated posteriorly; it is in the hollow thus formed that the segmental divisions may be seen. Three ridges are equally prominent ventrally, but they are not produced to a median point.

The Cephalon is not very much expanded, and a neck is not noticeable.

The Ocular tubercle is stout, not as tall as any of the three transverse ridges, and bears four well-developed eyes, above which it terminates in a short cone.

The Abdomen is rather long, directed obliquely upwards, not separated from the trunk by an articulation, and terminating in a blunt point. The cephalon bears a small blunt tubercle at its anterior margin on the outer side of the base of the chelifori, a pair of similar tubercles occur dorsally at the extremity of the lateral processes; smaller ones also on the first coxæ with traces of them on the second. The length of the body is 12 mm., its extreme width is 7 mm. The entire body is scabrous, a feature most distinctly noticeable on the transverse ridges and the abdomen.

The Proboscis is large, rather pyriform in shape, and measuring 10 mm. in length. It is movably articulated to the body on a large base, and widens slowly for one-third of its length where it is very slightly constricted; it is then enlarged again, and tapering very slightly, ends in a rather broad round point, the triangular mouth being of moderate dimensions. The proboscis is smooth, and its distal two-thirds are marked by three pairs of longitudinal bands, transversely divided near the tip.

The Chelifori are rudimentary and lie close together above the proboscis. The scape is short, slightly curved and enlarged distally; the chelæ are well developed, as long as the scape, one half of their length is taken up by a bulbous palm; the fingers are slender, quite smooth and much curved, but those of the two appendages are not exactly alike. With the exception of the fingers the entire appendage is scabrous.

The Palps arise laterally just outside the chelifori, and comprise nine joints (fig. 3a). The first is short and stout, the proportions of the second and fourth are as 8 to 11, the third being but little longer than the first; the remaining five are short and sub-equal, the middle one and the last being a trifle the longest, together they scarcely equal the length of the fourth. The fourth joint possesses a prominent tubercle with a glandular opening at two-thirds of its length. The entire appendage is more or less plentifully clothed with very minute spinous setæ; these however are only conspicuous on the ventral margin of the five terminal joints and at the end of the terminal one.

The Oviger is ten-jointed and rises ventrally immediately in front of the first lateral process, and appears to be that of a female (fig. 3b). It is not fully developed. The first joint is short and stout, the two following are twice as long and sub-equal, the third having the usual oblique termination. These three joints form a natural

curve in one direction, and the three following curve in another. Measured in their extreme length the proportions of the various joints of the appendage are : 3 : 6 : 6 : 8 : 7·75 : 7 : 4 : 4 : 2·5 : 4. The third and following joints are all more or less covered with very short stout setæ on the outer side of their curvature ; these setæ are most conspicuous on the fourth, fifth, and sixth joints, on the last of which they are also lateral. The last four joints each bear a small number of stout but simple spines, 4 : 8 : 7 : 6, not arranged in a single row. The last joint tapers to a blunt point, and is without a terminal claw, a small group of these spines taking its place.

The Legs attain a length of about 55 mm. Of the three coxæ the second is twice the length of the other two, the proportions of the remaining joints being 13·5 : 12 : 16 : 4, the last figure representing the tarsus and propodus together. The coxæ are densely clothed with very minute setæ, but on the femur they are much larger, though still small, and more conspicuous. They are arranged as a dorsal and a ventral band, separated laterally by a considerable interval, along the centre of which is a narrow band of similar setæ. This arrangement is continued along the tibiæ but it is not so distinct on the second. The distal fringes are quite normal and inconspicuous. The tarsus is a very small cup-like joint, covered with spinous setæ ventrally, with a few prominent ones distally. The propodus is uniformly covered with small spinous setæ, but ventrally there is a row of stout spines running the whole length of the joint. These spines are very irregular ; beginning from the proximal end the first three or four rapidly increase to large dimensions, the rest are very irregular in size, but none are so large as the last of the proximal series. The joint terminates obliquely, the dorsal projection is not large ; the terminal claw is stout, and its two auxiliaries are quite half as long, arising together from a process of the oblique termination.

The single specimen of this species is immature, and was taken in Winter Quarters at a depth of 125 fathoms.

AUSTRODECUS.

Body stout, and distinctly segmented, with lateral processes close together. Ocular tubercle anteriorly situated, long, with four well-developed eyes.

Proboscis immovably articulated to the trunk and ventral in position ; long, tapering, slender.

Chelifori absent.

Palps 6-jointed.

Oviger 6-jointed ? no terminal claw.

Legs short ; genital apertures on the second coxæ of all the legs in female. (Male as yet unknown.)

I have considered the affinities of this and of the succeeding genus in the introduction to this memoir.

Austrodecus glaciale.

(Plate VIII., fig. 1.)

Specific characters :—

Body stout, segmented, with lateral processes close together.
Proboscis long, tapering and curved near the extremity.
Chelifori absent.
Palps 6-jointed ; terminal joint articulated to one side of the penultimate.
Ovigers 6-jointed ?
Legs short, first coxæ armed dorsally with two spurs.
Abdomen long and slender.

This is a diminutive species ; the entire animal does not cover a space 8 mm. square.

The trunk is stout and distinctly segmented ; the lateral processes are not widely separated, but as they are rather short and tapering, the intervals at their distal extremities are very pronounced. The first coxæ, which are the largest, all bear dorsally a pair of stout tubercular spines which are very prominent. Each of the four segments of the trunk bears a stout tubercle of some elevation in the middle line, and close to its posterior border.

The Cephalon is scarcely expanded, and almost fills the interval between the first pair of lateral processes and their first coxæ. Anteriorly it bears a very long Ocular tubercle which is directed obliquely forwards, flask-shaped and truncated at its extremity, on the upper surface of which, in a compact group, are four very well-developed eyes.

From the truncated end of the trunk the Abdomen projects horizontally ; it is rather long and not separated by an articulation. On the ventral surface of the trunk a slightly raised band passes transversely between the first three pairs of lateral processes, with the last pair the band is interrupted in the middle line.

The Proboscis is long and of a peculiar shape, not unlike the snout of a weevil beetle. It is movably articulated to the body, and for about one-third of its length it is not disproportionately slender, then it tapers rather rapidly to a long and very slender structure, curved downwards near the tip. It is quite smooth and presents an annular appearance which is less distinct proximally.

The Chelifori are quite absent.

The Palps are six-jointed and arise above but well to the side of the proboscis (fig. 1b). The first joint is short and very stout, the second is long and extends beyond the extremity of the ocular tubercle. The third is very short and its distal limit indistinct. The fourth joint is rather more than half the length of the second. The second joint bears the stumps of several spinous setæ along its length ; on the fourth joint a similar number of curved spinous setæ occur, and these increase in size to the distal extremity of the joint, which also bears a few finer setæ and a small distal fringe. The last two are quite small and rather densely clothed with small setæ. The last one is articulated to one side, and not at the end, of the penultimate, and the setæ occur mainly on the outer side.

The Ovigers arise ventro-laterally, close to the angle formed by the cephalon and the first lateral process. They are extremely small, and it is open to question whether they are mature or not. As the removal of one of these appendages involves serious risk to the only specimen, it cannot be very satisfactorily described. Not less than six joints can be distinguished, the first three of which are very small. A small body-process from which the appendage arises may be an additional joint. The terminal joint is the longest, it is rounded at the extremity and does not carry any trace of a claw, nor are setæ of any kind discernible.

With regard to the Legs, the first coxa has already been alluded to as the largest of the three, the other two are very little if any shorter, and the second is dilated distally. It is difficult to get the limb in one plane for measurement, and the joints appear subject to some variation. The proportion of the joints appears to be 3·5 : 3 : 2·5 : ·5 : 2·5. The femur is stout, and the two following joints decrease in calibre. The limb bears a very few scattered setæ, most numerous on the second tibia. The tarsus is very small and cup-like, with two or three spinous setæ ventrally ; the propodus is proportionately long, slightly curved, and bearing a few setæ. On its ventral margin it carries a row of setæ, but there is nothing very distinctive about them. The claw is short and stout, and is accompanied by two slender auxiliaries.

The only example of this peculiar species is a female, and the Genital apertures are found in the middle of the second coxæ of all the legs.

Taken by the dredge in Winter Quarters before the ship was frozen in. Ten fathoms or less.

AUSTRORAPTUS.

Body with spurs on the lateral processes and first coxæ. Segmentation very imperfect.
Proboscis stout at the base, terminating in a point.
Chelifori rudimentary.
Palps 6-jointed.
Ovigers 10-jointed, without terminal claw or denticulate spines.
Legs comparatively long, terminal claw with two auxiliaries.

Austroraptus polaris.

(Plate VIII., fig. 2.)

Specific characters :—

Body rather stout, with prominent spurs on the lateral processes and the first coxæ.
Proboscis half the length of the trunk, pointed.
Palp 6-jointed, the terminal joint is twice as long as its predecessor, and articulated at an angle to it.
Oviger 10-jointed, without terminal claw or denticulate spines.
Legs long, terminal claw with two small auxiliaries.

The body is rather robust, with long lateral processes which arise close together and diverge considerably. These are provided dorsally with a pair of stout tubercular spines which exist also on the first coxæ, where they are greatly exaggerated.

The Cephalon is considerably enlarged, and almost completely fills the interval between the first pair of lateral processes.

The Ocular tubercle is stout and tall, terminating in a cone above the four well-developed eyes. It lies well to the front of the cephalon.

The Abdomen is long, cylindrical, almost horizontal, and not separated from the body by an articulation. The extreme length and breadth of the trunk is as 6 to 5·5, the abdomen increasing the length to 7·5. The articulation of the trunk is indistinct, that separating the last segment being non-existent. The entire body appears to be perfectly smooth.

The Proboscis is about half the length of the trunk; it lies underneath the cephalon, directed obliquely downwards; it is stout and cylindrical for the greater part of its length, tapering off to a sharp cone. It is movably articulated to the trunk.

The Chelifori are rudimentary; the scape is well developed, stout, not setose, a little longer than the cephalon; the chelæ are reduced to a knob, inclined inwards at an angle of about 45°, with only the merest traces of fingers.

The Palp is short and only possesses six joints. It rises close to the proboscis, below and outside the chelifori (fig. 2a). The first joint is short and stout, and the second is three times as long; the third is again very small and, forming an elbow, is shorter on one side than the other. The fourth is the longest joint, though but little longer than the second, the only setæ visible forming a small distal fringe. The following joint is characteristic; it is small, and its inner margin is just half the length of its outer border; this outer border is well supplied with setæ distally. To the oblique termination of this joint the sixth and last joint is articulated. It is twice the extreme length of its predecessor and richly setose on its outer border and extremity.

The Oviger is 10-jointed and rises ventro-laterally at the angle formed by the first lateral process with the cephalon (fig. 2b). It is a short appendage; the first three joints are short and stout, the second and third are sub-equal in length, but not in diameter, and nearly twice the length of the first; the two following are the longest joints, the fifth being a trifle longer than the fourth and sparingly setose; the sixth is short, the seventh is longer, and the three terminal ones progressively decrease in length and diameter, the last one being very small. The last five joints are sparingly supplied with setæ. On the terminal joint there are three long and stout ones. There is no terminal claw nor are there any special spines. The oviger of the male has not been removed, but does not differ essentially.

The Legs measure some 18 mm. in length. The second coxa is fully as long as the other two together, and is much enlarged distally. The femur and first tibia are sub-equal in length, and the second tibia is a very little longer; the tarsus and propodus together are rather more than one-third the length of the second tibia. The tarsus is very small and cup-like, richly setose ventrally, the setæ being stout, one

especially so. The propodus is very slightly curved and covered ventrally with short spinous setæ, with, proximally, a row of four stout spines. Dorsally the setæ are small and scanty. The terminal claw is large, more than half the length of the joint, and accompanied by two small auxiliaries. These claws arise on a process from the oblique termination of the joint. The extreme end does not project much beyond, and is supplied with numerous spinous setæ. The rest of the limb, coxæ, femur, and tibiæ are fairly well covered with very small setæ; their precise distribution is not easy to observe, but they appear to be deficient laterally; they are most abundant on the second tibia. The lateral line is well marked on the three largest joints.

The specimen above described is an adult female, and shows conspicuous Genital apertures on a swelling at the extremity of the second coxa of all the legs. An adult male shows smaller apertures on the three posterior legs only.

The female was taken in 100 fathoms, rough ground, off the Barrier, in Lat. 78° 16′ 14″ S., Long. 197° 41′ 47″ E.

The male was taken in 300 fathoms, mud, off the Barrier, in Lat. 71° 25′ 40″ S., Long. 185° 39′ 06″ E.

RHYNCHOTHORAX.

Rhinchothorax, O. G. Costa, Microdoride Mediterranea (1861), p. 7.

I have not seen Costa's original description of this genus or its attendant species. In the 'Challenger' Report (14) it is included by Dr. P. P. C. Hoek in his list of the then known species of Pycnogonida, and at the same time condemned as being insufficiently described. It is not a little remarkable that out of ten species then recorded from the Mediterranean only one is described in Dr. Dohrn's monograph (8). Zoologists are indebted to that author for the careful and full descriptions of the Pycnogonida therein recorded. The genus and species of *Rhinchothorax mediterraneus* Costa are fully described, and differ in many particulars from the original description.

Dr. Dohrn states—

That the Chelifori are absent.

That the Palp is eight-jointed, but that fusion has taken place, reducing the number of distinct joints to five. Five distinct joints are figured, the limits of the remainder being obscure.

That the Ovigers are eleven-jointed. In both figures, however, only ten joints are shown.

I have no hesitation in placing the species described below in the genus Rhynchothorax as defined by Dr. Dohrn for these reasons: the general aspect of the animal is similar; the proboscis is cleft at its extremity; though the palps are only five-jointed, the feebly-developed extremity seems to indicate some reduction is taking place; and the ovigers are ten-jointed, and the exact counterpart of those figured by Dr. Dohrn.

Rhynchothorax australis.

(Plate VIII., fig. 3.)

Specific characters :—

Body very robust, with lateral processes quite close together, and with median tubercles on the segments.

Chelifori absent.

Palps 5-jointed, the second joint with a very strongly developed spur dorsally.

Ovigers 10-jointed, with a terminal claw, the last four joints with a couple of spines on an enlarged base.

Legs short, terminal claw with two small auxiliaries.

Body very robust, with the lateral processes short and quite close together, widest across the first lateral process, and about half the breadth across the last.

The posterior articulation of the trunk is deficient, but immediately in front of where it should be, as on the preceding segments, is a stout median tubercle, bluntly pointed, and very slightly inclined forwards.

The Cephalon is expanded, but very short. The Ocular tubercle, which is stout, projects forwards and upwards over the base of the proboscis. It bears four well-developed eyes, the posterior pair being a little the larger, and terminates above them in a short cone. Measured from the anterior margin of the ocular tubercle, the cephalon is half the length of the first segment of the trunk.

The Abdomen is long, about as long as the two combined segments from which it originates.

Proboscis is stout, conical, a little longer than the first trunk segment. A conspicuous slit marks the mouth as the animal lies in its normal position.

Chelifori, no trace.

Palps. These appendages only comprise five joints, and are very curiously modified (fig. 3a). Each rises at the side of the proboscis and extends but little beyond it. The first joint is short and stout, the second is the longest of the appendage; its dorsal extremity is prolonged forwards and upwards as a stout spur. The third joint is about half as long as the shaft of the second, it is enlarged distally, a stout dorsal tubercle bearing a tuft of setæ; a few other setæ are more scattered. The fourth joint is small and setose, while the fifth, which is also richly setose, is reduced to a mere button.

The Oviger is very slender, ten-jointed, and rises ventro-laterally at the neck (fig. 3a). The first three joints are short, and progressively lengthen, but only to a slight degree. The fourth is nearly as long as the three together. The fifth is shorter, but swollen distally. The sixth is shorter still. No setæ are discernible on any of these joints. Of the four terminals the first three are sub-equal in length, but their dorsal surfaces become more and more curved. Ventrally, also, there are prominent projections which bear the denticulate spines. The terminal joint is very broad, and a little longer than the others; its dorsal outline is very much curved, and ventrally a large swelling occupies almost the whole surface; one small spine is

all that is visible. A prominent claw terminates the appendage. The denticulate spines are few in number, two on each of the first three joints. They are worn, and all that remains is a slender shaft of uniform diameter with three terminal teeth, of which the middle one is the largest.

The Legs are short. The three coxæ are short and stout, the second is by a very little the longest, but the first has nearly twice its diameter; it also bears a tubercle smaller than, but similar to, those borne on the middle line of the trunk. The femur is stout, and not so long as the three coxæ together, but the remainder of the appendage is much more slender. The proportions of the two tibiæ are as 3 to 2, the tarsus and propodus together being as long as the second tibia. The tarsus is a very small joint, its ventral surface being covered with minute spinous setæ. The propodus, which is curved, has a row of them along its ventral margin, separated by rather wide intervals; several setæ are scattered dorsally. The terminal claw is stout and is accompanied by two slender auxiliaries about one-third its size. A few setæ are scattered on other parts of the appendage, but they do not form a prominent feature.

The Genital apertures are distinct on the second coxæ of the last pair of legs only, and this joint is much swollen in consequence.

This species, of which there is only a single specimen, was found by Mr. Kirkpatrick on a sponge. Winter Quarters, at a depth of 178 fm., 7 Aug., 1902.

COLOSSENDEIS.

Body ovoid or elongate, with the lateral processes close together or widely separated, as a general rule without segmentation. Cephalon small. Eyes well developed or absent.

Proboscis very large, often much longer than the body, and movably articulated to it.

Chelifori very rarely present, rudimentary.

Palps very long, 10-jointed, third and fifth joints the longest, more or less setose.

Ovigers very long, 10-jointed, fourth and sixth joints the longest, the last four joints bearing several rows of spines usually dentate. A terminal claw.

Legs without auxiliary claws; the three coxal joints short.

Abdomen of moderate dimensions, movably articulated to the trunk, sub-clavate.

Genital apertures on the second coxa of all the legs.

I defined this genus in comparison with *Decolopoda* in the *Zoologischer Anzeiger* (13), retaining as far as possible the words of Jarzynsky. Certain characters made use of by Professor G. O. Sars (25) have been incorporated, since his definition has become inapplicable in certain important features.

No less than eighteen species and two varieties have been described. Through the generosity of Professor E. L. Bouvier I have been permitted to examine the collection of Colossendeids made by the 'Travailleur' and 'Talisman,' the description of which is not yet published. The identity of these species with the known species, or otherwise, has not yet been fully established, but four new species from the Antarctic Regions are now described.

Colossendeis australis.

(Plate IX., fig. 1 ; Plate X., figs. 1 and 2.)

Specific characters :—

Body stout, with lateral processes widely separated, minutely scabrous, the spines being arranged in distinct rows on the appendages.

Proboscis enormous, bottle-shaped, more than half as long again as the body. Eyes, four, well developed.

Palp 10-jointed, the eighth and ninth joints equal, the tenth longer.

Claw of legs less than half the length of the propodus.

Under a lens the entire animal exhibits a beautifully mottled appearance, which, to a greater or less extent, appears to be characteristic of the genus. The Body shows the faintest traces of segmentation ; the cephalon is short and only very little expanded, and the first pair of lateral processes is placed close against it..

The Ocular tubercle is situated in the middle of this area and is stout, with four well-developed eyes, two anterior and two posterior, the latter smaller than the others.

The Proboscis is of much greater diameter than the body, to which it is movably articulated; throughout the greater part of its length it is curved downwards; the mouth is very large. The organ is covered with minute spines, which seem to have, to some extent at least, an indistinct linear arrangement; the difficulty of making out their precise arrangement is accentuated by a growth of polyzoa.

The Abdomen is of moderate dimensions and somewhat clavate.

The ten-jointed Palp arises ventro-laterally, as close as possible to the proboscis. The two first joints are very short, and the third is rather more than twice the length of the fifth ; the fourth is small ; the sixth is barely one-third the length of the fifth, and the seventh is about half as long again as its predecessor ; the eighth and ninth are shorter and sub-equal ; the terminal one is absent from one side and injured on the other, but in the other specimen available it is a little longer. The lateral line appears along the greater part of the appendage. The entire limb is spinose, beginning with the third joint, and the minute spines are arranged longitudinally in rows as far as the end of the fifth joint, which, with the two preceding, bears a more or less complete whorl of spines at its distal extremity. Beyond the fifth joint the spines become stiff setæ rather than spines; they are larger and more abundant and irregular, besides being aggregated on the ventral and inner side in the natural position of the limb.

The Ovigers are very long and, as characteristic of the genus, 10-jointed (fig. 1a). They arise from a small body-process immediately behind the palps, but nearer the middle line. The first three joints are small, the fourth and sixth are the longest and sub-equal, the fifth being about a quarter their size. The last four are sub-equal, and the appendage terminates in a small claw. The lateral line is distinctly marked. The entire limb is spinous. A few minute spines exist on the first three joints, beyond these they are arranged more or less clearly in lines and are more numerous. There is also a fringe of small spines on the outer margin of the distal extremity of each

joint, but these are either inconspicuous or absent on the four terminal joints. With regard to the characteristic groups of spines on the four terminal joints, there are four rows on the three proximal joints and three only on the terminal joint. In both specimens the spines are so much worn as to give but a feeble idea of their true character (Plate X., figs. 1 and 2). The large size of the sockets in which they are planted is remarkable. The most ventral row, that which lies nearest the sea bottom in the natural position of the animal, comprises a small number, less than a dozen, of large stout spines. The second row, which in this species is not separated from the first by any conspicuous interval, contains approximately double the number of smaller spines; the sockets of this row are sometimes crowded together, and the spines are smallest and most crowded at the proximal end of the joint, and are also deflected from a straight line by the articulation of the succeeding joint. Two other rows follow, but these have not the mathematical regularity of the former, nor are they so much deflected; they are reduced in number, but not in size. In structure the large spines appear to consist of a stout base almost circular in section and composed of a strong chitinous investment having a protoplasmic core; the spine tapers to a blunt point much worn, but with enough left to indicate a flattened blade at the extremity.

The Leg attains a length of 115 mm. The three coxæ may be regarded as sub-equal in size, and short. The two tibiæ are the longest joints and sub-equal, except in the first leg, where the second tibia is a trifle shorter than the first. The femur is a little shorter, and the tarsus less than half the length of any of the three preceding joints; the propodus is just over half the length of the tarsus. On the first coxa there is dorsally and ventrally a median line of reddish colour, which appears to indicate the presence of a slight groove. On the second coxa the lateral line begins on each side of the joint, and passes to the extremity of the limb. The three coxæ are minutely scabrous and possess a small fringe of minute spines at their distal margins. The remaining joints are more or less covered with these fine spines, which become a little more conspicuous as the extremity of the appendage is reached. Six rows are fairly well defined throughout the limb, a median dorsal, a median ventral, and two lateral, one on each side the so-called lateral line. The distal extremity of each joint bears a fringe of spines on the inside of the bend, largest and most conspicuous on the second tibia. The terminal claw is small, less than half the length of the propodus.

The Genital apertures occur on the second coxa of all the legs in both sexes, as shown in figs. 1b and 1c.

The above description has been prepared from an example taken in deep water. Another from shallow water presents certain differences: first, it is more spinose, especially the proboscis and the limbs; on the legs four additional irregular rows of spines may be distinguished between the six described for the deep-water specimen, two of these are dorsal and two ventral: and secondly, in the comparative length of

certain joints. The third joint of the palp is distinctly less than twice the length of the fifth, and the fourth joint of the ovigerous leg is a little longer than the sixth.

The nearest ally of this species seems to be *C. proboscidea*, Sabine, from which, however, it may be instantly recognised by the wider intervals between the lateral processes and the presence of well-developed eyes.

Two specimens of this species were taken, one off Cape Wadworth, Coulman Island, 8-15 fm.; bottom : stones; the second off Mounts Erebus and Terror, 500 fm.; bottom : stones.

This latter specimen is the carrier of some half-dozen cirripedes of the genus *Scalpellum.*

Colossendeis glacialis.

(Plate IX., fig. 2 ; Plate X., figs. 3 and 4.)

Specific characters :—

Body apparently smooth, with lateral processes widely separated, and four well-developed eyes.

Proboscis not quite so long as the trunk, slightly dilated about the middle, and covered with short spinous setæ.

Palps, three terminal joints sub-equal and densely setose, with wide and deep constrictions at the joints.

The body is rather stouter proportionally than the last two species, and though apparently smooth, a lens reveals a median row of extremely minute setæ.

The Cephalon is not expanded beyond the average width of the body.

The Ocular tubercle is stout, and bears four eyes, the anterior pair larger than the posterior; the portion above the eyes is acutely pointed, but this feature is variable in size. The setous character of the proboscis is not always easily discernible ; in one specimen it is prominent, in others less so, even when not concealed by a growth of polyzoa. It can hardly be said that these setæ are arranged in any definite manner, but in places they give the impression of ill-defined rows.

The Abdomen is short and articulated to the trunk. The Proboscis is as defined among the specific characters and flexibly united to the trunk.

The Palps arise on the ventral side of the proboscis (fig. 2) ; the first joint is rather more prominent than usual, and is readily seen from the dorsal surface. The second joint is shorter, the third is considerably the longest of the appendage, the fourth is quite short, and the fifth is approximately two-thirds the length of the third; this joint has a faint constriction at about two-thirds of its length. The following joint is short, the next a little longer, the three terminal joints being short and sub-equal. The extremity of the palp has a peculiar appearance, owing to the seventh, eighth, and ninth joints, and to a less extent the sixth, having their distal extremities rounded off like the shoulders of a wide-mouthed bottle, so that each joint seems balanced on a narrow base. The entire appendage is beset with stiff setæ, almost spinous in character. On the third joint they are short, somewhat sparsely distributed, and appear to be arranged in rows. A whorl of stouter setæ (spines ?)

surround the distal extremity of this joint and the next; beyond this the setæ are so thickly distributed that it is scarcely possible to make out any definite arrangement. On the fifth joint some of the setæ are distinctly longer than the majority, and from this joint the setæ on the inner side of the appendage, in its natural position, are much the longest.

The Ovigers arise immediately behind the palps on a conspicuous body-process close to the middle line (fig. 2a). The first three joints are small, and bear spinous setæ of small size. The fourth and sixth are very long and sub-equal, the fifth being not more than a quarter of their length. The four terminal joints are sub-equal in length, but decrease in stoutness. The entire appendage is setose. On the fourth joint the setæ are small and arranged in rows, and on the outer margin, at about two-thirds of its length, a small but distinct, rounded protuberance occurs. On the succeeding joints the setæ or spines, whichever they may be called, are more thickly distributed. The characteristic spines of the four terminal joints present very slight differences from the two preceding species. On the ventral side of the limb in its natural position are two rows of these spines separated by a conspicuous interval; the more ventral of these two rows consists of a few large spines, the other contains approximately double the number of smaller spines. Dorsally, and separated by an interval, are two rows of smaller spines, which are not, however, arranged with such precision as the others. Close examination reveals the fact that the intervals between the rows of spines are more apparent than real, this effect being due to the set of the first two rows and the third group or double row; the second row is deflected at the extremity by the articulation of the succeeding joint. The spines do not present any special peculiarities, being more like true spines than in the other species here described. They are somewhat curved or falciform (Plate X., fig. 3). The terminal claw is of moderate dimensions, rather slender, but with a stout base; in most of the specimens the stout base is all that is left. All four terminal joints are dorsally covered with short spinous setæ set in sockets (Plate X., fig. 4). In this species they are much more numerous than in the other three.

Concerning the Legs, the first coxa has a slightly greater diameter than the others, and bears the dorsal and ventral mark so characteristic of the genus. The other two coxæ are nearly equal in length and all are minutely spinose. The Genital apertures occur on the second coxæ of all the limbs, and the lateral line beginning on that joint is conspicuous to the end of the limb. The first tibia is the longest joint of the limb, the femur is very little shorter, the second tibia approximates to three-quarters the length of the first, and the tarsus to very nearly half its length; the propodus is shorter than the tarsus by nearly a third, and the claw is less than half the length of the propodus. The entire limb is covered with minute setæ, which, along the dorsal surface at any rate, have a distinct linear arrangement; ventrally this becomes indistinct from the second tibia onwards. The distal extremity of each joint, including the coxæ, is more or less completely girdled with spines, minute up to

the extremity of the femur, and most numerous dorsally; on the first tibia they increase in size ventrally, and still more so on the second tibia; on the tarsus and propodus the ventral setæ are comparatively long and conspicuous.

The specimen from which the above description was taken seemed to be an exceptionally spinose individual. Seven specimens were obtained, and in the other six all the features described above can be seen, though to a less degree, when not concealed by a growth of polyzoa.

Winter Quarters, 12 to 25 fathoms.

Colossendeis frigida.

(Plate IX., fig. 3; Plate X., figs. 5 and 6.)

Specific characters:—

Body smooth, with lateral processes widely separated. Four well-developed eyes.

Proboscis approximately twice the length of the trunk, dilated about the centre and quite smooth.

Palps, 10-jointed; eighth joint half the size of the two terminals, which are sub-equal.

Ovigers, with a group of four or five irregular rows of special spines in addition to the two primary rows.

Claws of legs about half the size of the propodus.

This last character, together with the spines and terminal claws on the ovigers, readily separate this species from *C. megalonyx*, to which it appears very closely related.

A considerable amount of latitude must be allowed on the proportions of the joints of the various appendages as a guide to specific discrimination. Thus the proboscis varies in length from 11 mm. to rather more than 21 mm., and the trunk to the base of the abdomen, from rather less than 6 mm. to rather more than 11 mm., but the longest proboscis does not coincide with the longest body. The same sort of variation occurs throughout.

There is no trace of segmentation in the trunk, and the Proboscis is articulated to it, hence the variation of the angle to which it may be inclined.

The Ocular tubercle is stout, sharply conical above the eyes, which are well developed and four in number.

The Abdomen is quite small and articulated to the trunk.

The Palps are ten-jointed. The third joint is much longer than the fifth, which reaches almost to the extremity of the proboscis. The fourth joint is very small, and the seventh is slightly longer than the sixth; the eighth is quite short, the two terminals being twice its size and sub-equal. Towards the extremity of the fifth joint very minute setæ make their appearance, and on the rest of the appendage they are scattered in more or less definite rows.

Ovigers: These appendages arise close to the middle line behind the palps (fig. 3). The first three joints are very small, the fourth and sixth long and sub-equal, the sixth as a rule extending beyond the proboscis. The fifth joint is about half the length of the sixth. The four terminal joints are sub-equal, and the claw has a peculiar appearance, as if the inner margin had been bevelled off at a very acute

angle. In its perfect condition it is rather long and slender, especially the distal half. Something like one-half of this slender portion, at the tip of the claw, is flattened dorso-ventrally to form a sort of protective shield to a thin membranous fold lying like a knife-edge on the under surface of the claw throughout its distal half (fig. 3a). The claw is covered with very minute hairs. The characteristic spines are very numerous, and are arranged in two sharply defined lines followed by a closely arranged group in which five rows can be distinguished. A distinct interval separates the first two rows from each other and from the group referred to above. The spines of the first row are long, slender, lanceolate in shape, and set as closely together as possible (Plate X., figs. 5 and 6). Those of the second row are approximately double in number, shorter and more spathulate, their essential structure being the same. They have a fairly stout base tapering to the centre, where it becomes a flat blade, the entire margin of which is provided with minute teeth visible under a one-inch objective. In the group of spines there are five rows arranged in an imbricate manner and as the spines of these rows alternate fairly regularly oblique rows of eight spines may be distinguished in the broadest part of the group. In structure they resemble those of the second row. Setæ are sparsely distributed over the appendage and though very minute they are not difficult to distinguish.

The legs of the numerous specimens average between 58 mm. and 106 mm. in length; the proportions of the joints do not, however, vary greatly. The first coxa bears a reddish line marking a very shallow groove dorsally and ventrally; the lateral line begins on each side of the second coxa, and is continued to the extremity of the limb. The three coxæ are sub-equal. The femur is the largest joint of the limb as a rule, the other joints decreasing in size to the extremity. The claw is about half the length of the propodus.

The Genital apertures occur on the second coxa of all the limbs of both sexes. The legs are apparently quite smooth, even to the touch, but close examination shows faint traces of rows of setæ. In some of the larger specimens these are a little more conspicuous.

Specimens of this species were taken in Winter Quarters in depths varying from 5 to 178 fathoms, and the name is derived from the fact that two of them had to be taken to the ship dry, a distance of nearly two miles, at a temperature of $-50°$ Fahr. They suffered in consequence. Another specimen taken in 300 fathoms; bottom, mud; off the Barrier, 27.1.'02, is referred to this species.

Colossendeis rugosa.

(Plate IX., fig. 4; Plate X., fig. 7.)

Specific characters:—

Proboscis half as long again as the body, slender, dilated about the middle, with a median row of curved spines dorsally along the proximal half.

Body smooth, with lateral processes widely separated, and, with the first coxa, dilating distally.

Palps 10-jointed, the eighth very short; the ninth rather more than twice its length; the terminal one a little larger still.

Legs provided with rows of spines, claw large.

This species in general appearance very closely resembles the last, but may be readily distinguished by its spiny character and the features quoted above.

The Body is quite smooth, the cephalon short and without any constriction indicating a neck.

The Ocular tubercle is stout, with four well-developed eyes, the anterior pair being larger than the posterior pair. Above the eyes the tubercle is acutely conical.

The Proboscis is half as long as the body as indicated in the specific characters, and besides the median row of spines there is a lateral row of a few, widely separated. The proboscis is movably articulated to the body, and obtusely pointed distally.

The Abdomen is small, somewhat clavate, but presenting no special feature.

The Palps arise on the ventral side of the body, as close as possible to the proboscis. They arise on a process of the body which is usually regarded as the first joint, but which has always appeared to me to be doubtful whether it is a real joint or not. In this particular species it is definitely a body-process and not a true joint. The succeeding joint, here as elsewhere called the second, is very short, a mere ring-like segment. The third is considerably the longest joint of the appendage, slender and furnished with a few prominent curved spines; the fourth is quite small; the fifth is two-thirds the length of the third; and a short distance from the distal extremity there is a distinct constriction as though there had been a joint there and it had fused; the sixth is short, and the seventh is about half as long again; the eighth joint is very short, scarcely half the length of the sixth; the ninth is fully twice the length of the eighth, and the terminal one a little longer, rounded at the extremity. From, and including the fourth joint, the entire organ is covered with minute spines, too plentifully distributed to assert any regular disposition.

The Ovigers arise laterally from two body-processes close to the middle line and immediately behind the proboscis (fig. 4). The first three joints are very small and sub-equal in length; the fourth and sixth are very long and sub-equal, the fifth being about one-third of their length; of the four terminal joints, the proximal is the largest. The claw is of moderate dimensions. The entire appendage is covered with very minute spines, which become numerous from the fourth joint, and appear to be very generally distributed. The characteristic spines of the four terminal joints are limited to four rows with an occasional small spine which may perhaps be regarded as the remnant of a fifth row. It is unfortunate that in the only specimen obtained (Plate X., fig. 7) these spines are very much worn. An interval separates the two first rows, and another interval separates the second row from the remainder.

The spines of the first row are long, slender and few in number. They have a somewhat stout base which, as far as can be judged without cutting sections, appears to be rounded on one side and flattened or somewhat concave on the other; they are constricted in the middle, and produced onwards as a flat blade with dentate margins. The spines of the second row are smaller, twice the number, and placed as

close together as possible. In both these rows the spines are set at right angles to the joint, in the other rows they are arranged parallel to the length of the joint. All these are essentially the same in character, but in the "parallel" series, the spines, being viewed more laterally, appear to be curved and the blade forms a very shallow scoop.

The Legs are provided with longitudinal rows of curved spines, not very numerous, especially on the ventral surface, most abundant and conspicuous on the femur. The first coxa is conspicuously broader than the others. The lateral processes of the body are narrow proximally and widen distally, the first coxa continuing this widening. The two following coxæ are of less diameter, sub-equal in length, the distal extremity of each is fringed with minute spines, the fringe, however, not being complete. The femur is conspicuously the longest joint of the limb, the other joints progressively shorten, the amount of decrease being obvious. The claw is nearly the length of the propodus. A few additional spines are to be found ventrally at the distal extremity of some of the joints.

The Genital apertures open on the second coxa of each leg.

A single specimen of this species was taken off the Barrier in lat. 78° 25′ 40″ S., long. 185° 39′ 6″ E., 300 fms., bottom, mud, 27 Jan. 1902.

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EXPLANATION OF THE PLATES.

PLATE I.

FIG. 1.—Phoxichilus australis. ♀ × 2.
2.—Pseudopallene australis. ♀ × 3.
2a.—Oviger, five terminal joints. ♀ × 20.
2b.—Denticulate spine from tenth joint. × 880.
3.—Pseudopallene cornigera. ♀. Oviger, five terminal joints. ♀ × 20.
3a.—Denticulate spine from eighth joint. × 530.
4.—Pallenopsis hiemalis. ♀ × 3.
4a.—Oviger, six terminal joints. × 27.

PLATE II.

FIG. 1.—Pallenopsis villosa. ♀ × 3.
1a.—Chela. × 18.
1b.—Oviger. × 10.
2.—Pallenopsis pilosa. ♀ Hoek. Oviger, five joints, terminal one missing. × 22.
3.—Pallenopsis hiemalis. ♀. Terminal joints of leg. × 12.
3a.—Specimen from Cape Wadworth. Terminal joints of legs. × 12.

PLATE III.

FIG. 1.—Nymphon hiemale. ♂ × 2.
1a.—Palp. × 14.
1b.—Oviger, five terminal joints. × 16.
FIG. 2.—Nymphon lanare. × 3.
2a.—Palp. × 14.
2b.—Oviger, five terminal joints. × 13.
FIG. 3.—Nymphon adareanum. ♂ × 8.
3a.—Palp. × 70.
3b.—Oviger, five terminal joints. × 80.
FIG. 4.—Nymphon frigidum. × 10.
3a.—Palp. × 56.
3b.—Oviger, five terminal joints. × 60.

PLATE IV.

FIG. 1.—Chætonymphon villosum. × 4.
1a.—Palp. × 17.
1b.—Oviger, five terminal joints. × 17.
FIG. 2.—Chætonymphon biarticulatum. ♀ × 3.
2a.—Palp. × 27.
2b.—Oviger. × 16.
FIG. 3.—Chætonymphon mendosum. ♀ × 4.
3a.—Palp. × 20.
3b.—Oviger. × 32.
FIG. 4.—Chætonymphon australe var. austrinorum. ♂ × 3·5.
4a.—Palp. × 14.
4b.—Oviger. × 13.

PLATE V.

FIG. 1.—Pentanymphon antarcticum.
1a.—Palp. × 27.
1b.—Oviger. × 40.
1c.—Denticulate spine from eighth joint. × 630.

PLATE VI.

FIG. 1.—Leionymphon grande. ♀ × 2.
1a.—Oviger × 4.
1b.—Third leg, terminal joints. × 8.
1c.—Right oviger of immature specimen. × 4.
1d.—Right oviger of immature specimen. × 4.
1e.—Right oviger of immature specimen. × 10.
1f.—Right oviger of immature specimen. × 10.
FIG. 2.—Leionymphon minus. × 2.
2a.—Oviger. ♀ × 10.
2b.—Oviger. ♂ × 10.
2c.—Denticulate spine from joint of oviger. ♂ × 265.

PLATE VII.

FIG. 1.—Leionymphon australe. ♀ × 3.
1a.—Oviger, five terminal joints. ♀ × 30.
1b.—Oviger, five terminal joints. ♂ × 23.
FIG. 2.—Leionymphon spinosum. ♀ × 2.
2a.—Palp, five terminal joints. × 20.
2b.—Oviger, five terminal joints. × 20.
FIG. 3.—Leionymphon glaciale. ♀ × 1·5.
3a.—Palp, five terminal joints. × 11.
3b.—Oviger, six terminal joints. × 11.

PLATE VIII.

FIG. 1.—Austrodecus glaciale. ♀ × 15.
1a.—Lateral view of body without appendages. × 15.
1b.—Palp. × 56.
FIG. 2.—Austroraptus polaris. ♀ × 5.
1a.—Palp. × 40.
1b.—Oviger. × 31.
FIG. 3.—Rhynchothorax australis. × 15.
Palp. × 72.
Oviger. × 88.

PLATE IX.

FIG. 1.—Colossendeis australis. ♀ × 1.
1a.– Oviger, four terminal joints. × 4.
1b.—Outlines of second coxa showing sexual aperture. ♀
1c.—Outlines of second coxa showing sexual aperture. ♂.
FIG. 2.—Colossendeis glacialis. Palp, terminal joints. × 8.
2a.—Oviger, four terminal joints. × 8.
FIG. 3.—Colossendeis frigida. Oviger, four terminal joints. × 8.
3a.—Terminal claw of Oviger. × 265.
FIG. 4.—Colossendeis rugosa. Oviger, four terminal joints. × 8.

PLATE X.

Colossendeis.

FIG. 1.—C. australis. Special spine from eighth joint of Oviger. Principal row. × 100.
2.—C. australis. Special spine from eighth joint of Oviger. Second row. × 100.
3.—C. glacialis. Special spine from eighth joint of Oviger. Much worn. × 265.
4.—C. glacialis. Seta from dorsal surface of ninth joint of Oviger. × 265.
5.—C. frigida. Special spine from tenth joint of Oviger. Principal row. × 265.
6.—C. frigida. Special spine from tenth joint of Oviger. Second row. × 265.
7.—C. rugosa. Special spine from tenth joint of Oviger. Principal row. × 265.

Nymphon.

Denticulate spines from tenth joint of oviger.

FIG. 8.—N. hiemale. × 350.
9.—N. lanare. × 455.
10.—N. frigidum. × 645.

Chætonymphon.

Denticulate spines from oviger.

FIG. 11.—C. villosum, seventh joint. × 438.
12.—C. biarticulatum, tenth joint. × 630.
13.—C. mendosum, tenth joint. × 410.
14.—C. australe, tenth joint. × 480.
15.—C. australe var. austrinorum, tenth joint. × 512.

Note.—The magnifications of Messrs. West, Newman & Co.'s drawings are approximate only. The drawings were made on squared paper, with the assistance of an eyepiece micrometer, and in many cases have been reduced to fit the plates.

INDEX.

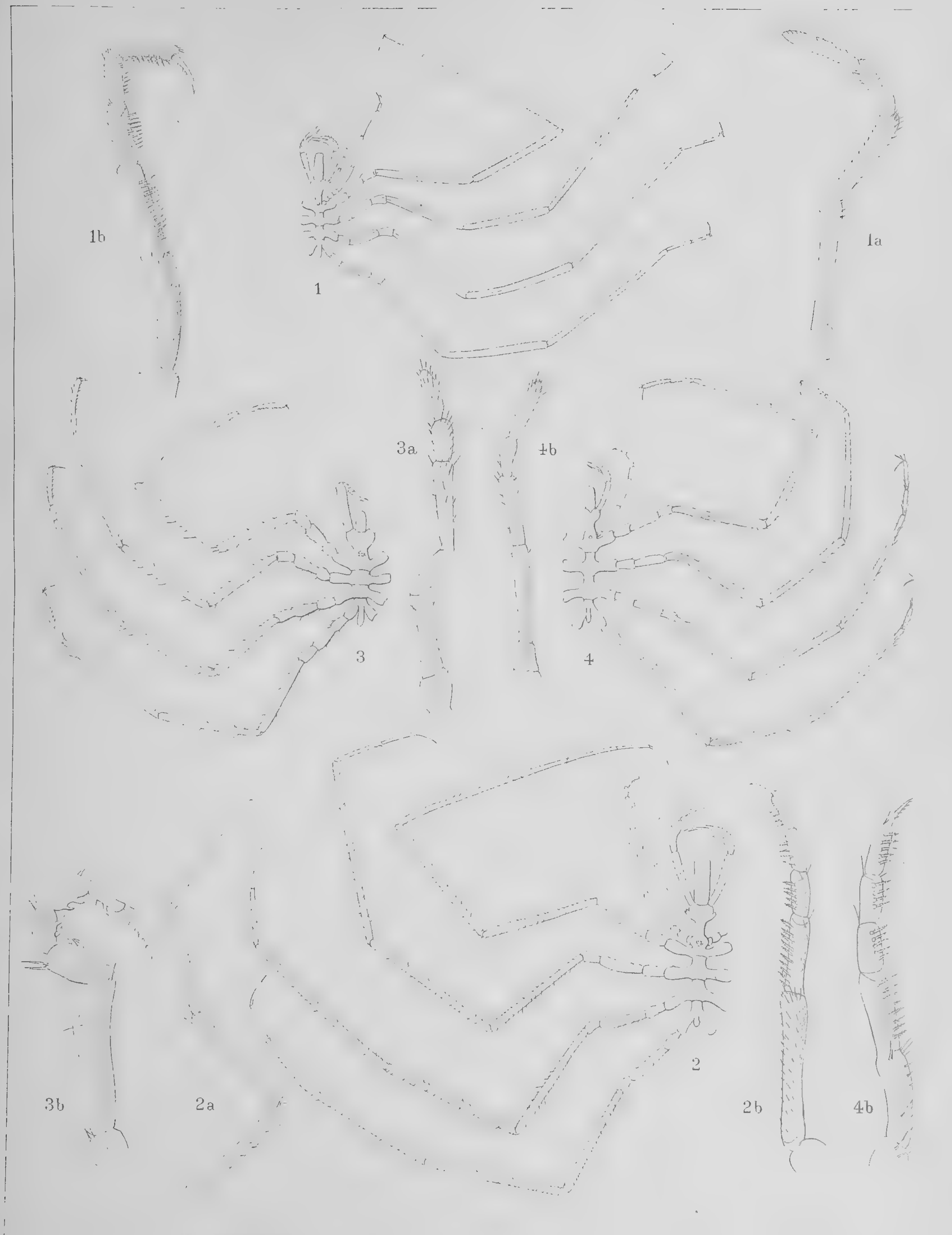
West, Newman del. et lith

ilus australis   2. Pseudopallene australe.
ene cornigera.   4. Pallenopsis hiemalis.

Figs. 1, 1a & 1b. E.W. Sexton del. West, Newman lith.

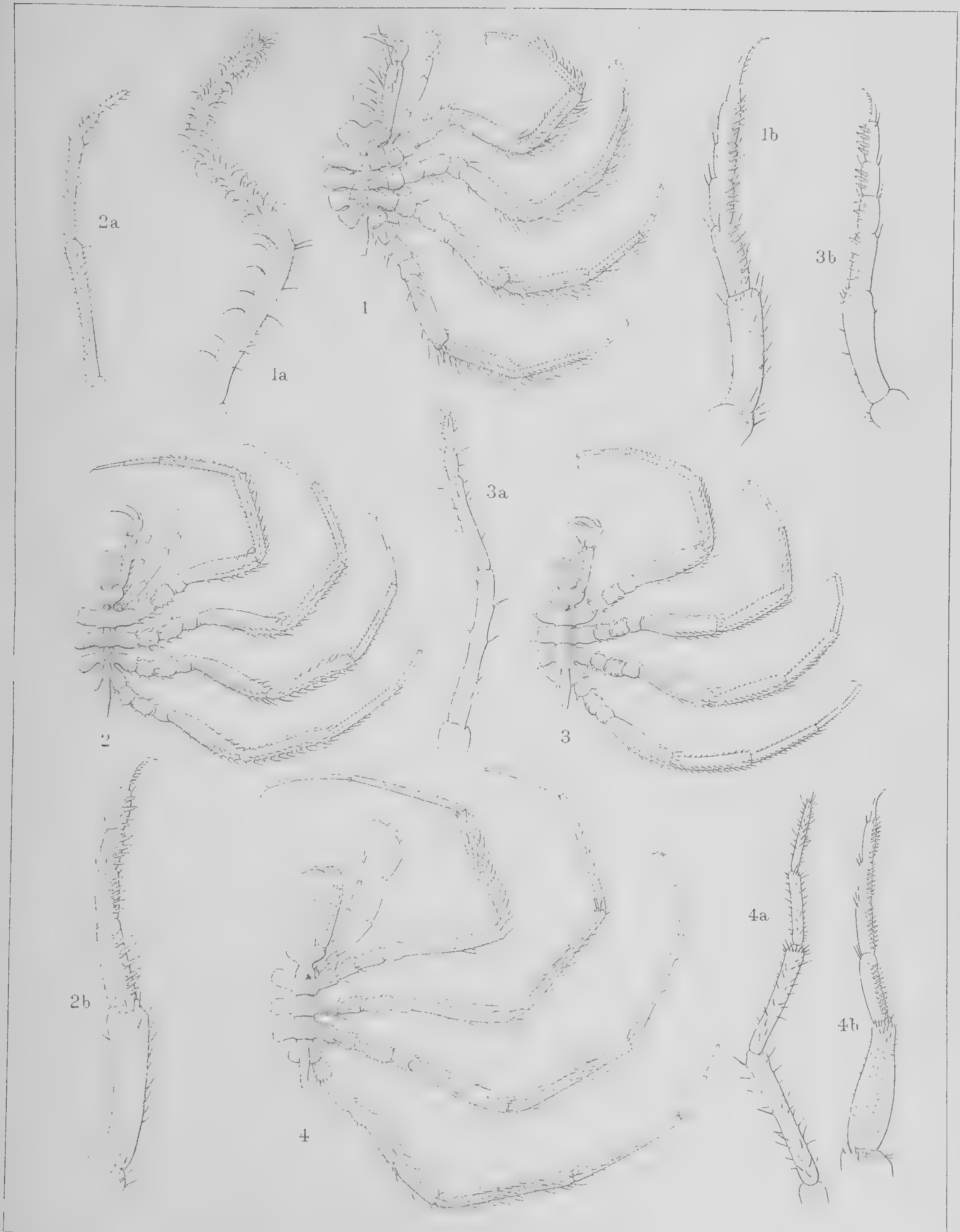
Pallenopsis.

1. P. villosa. 2. P. pilosa. 3. P. hiemalis.



West, Newman del et lith

Nymphon.
1. N. hiemale. 3. N adareanum.
2. N. lanare. 4. N. frigidum.



West, Newman del et lith.

Chætonymphon.
1. C. villosum. 2. C. biarticulatum.
3. C. mendosum. 4. C. austrinorum.

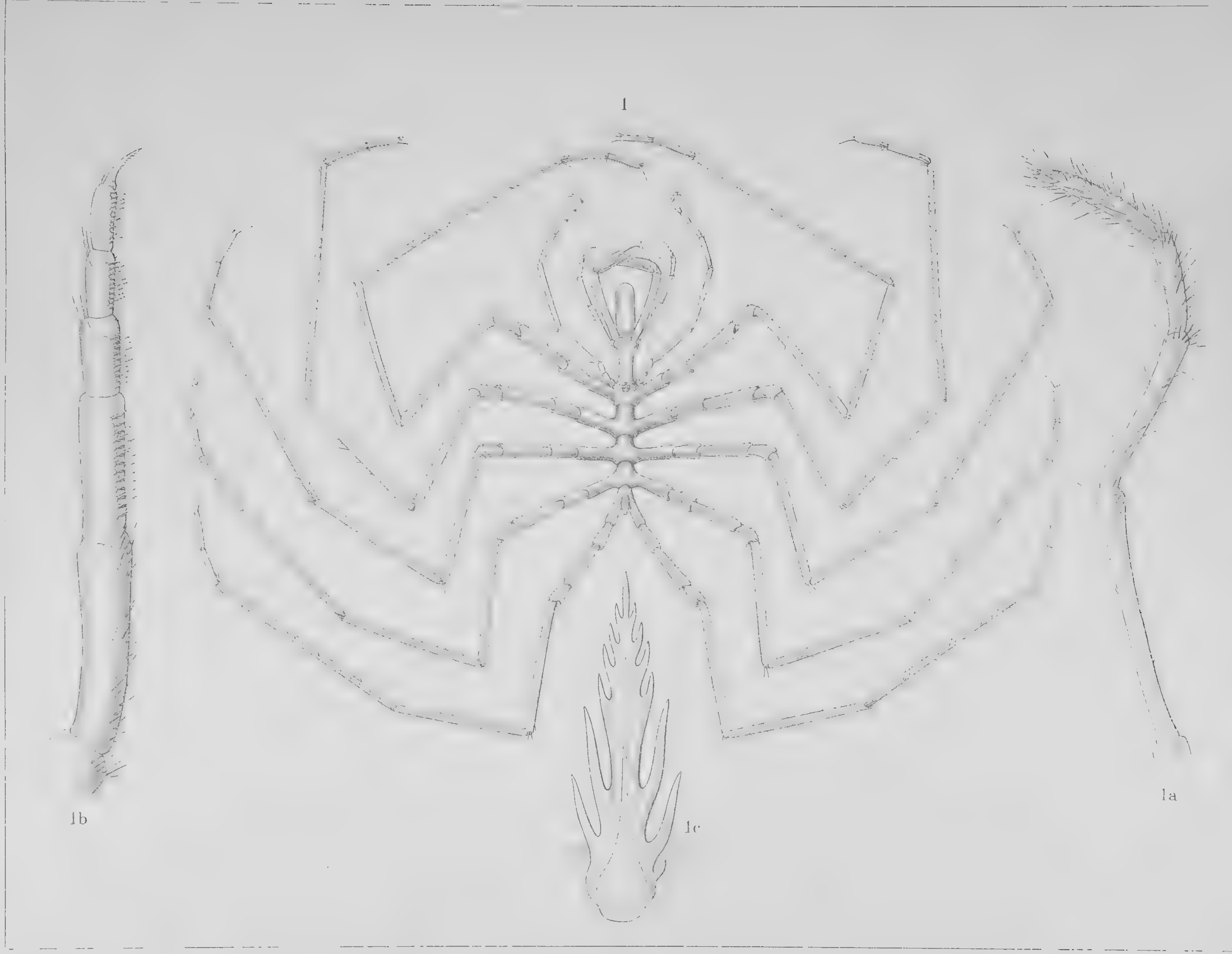
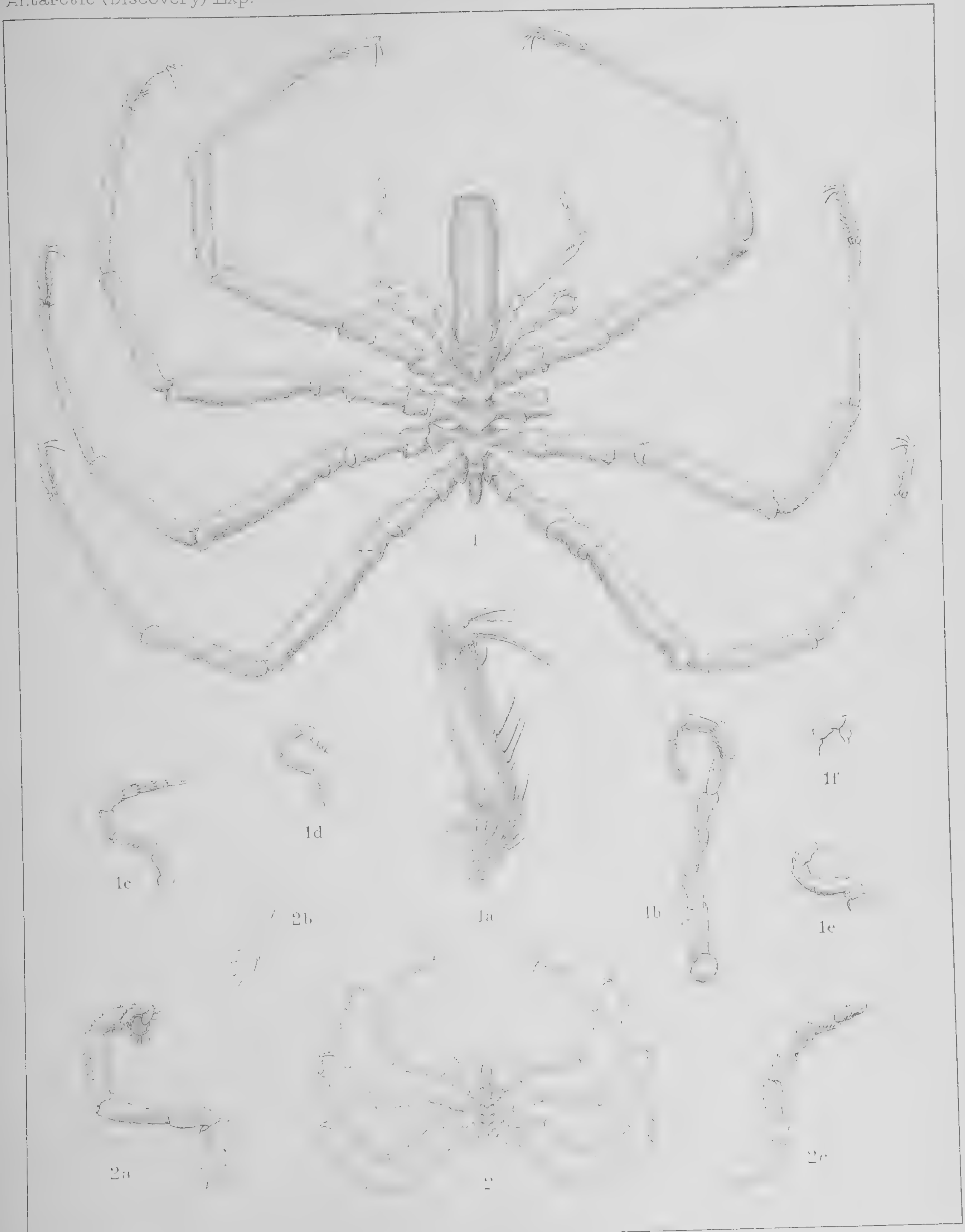


Fig.1. E.W.Sexton del

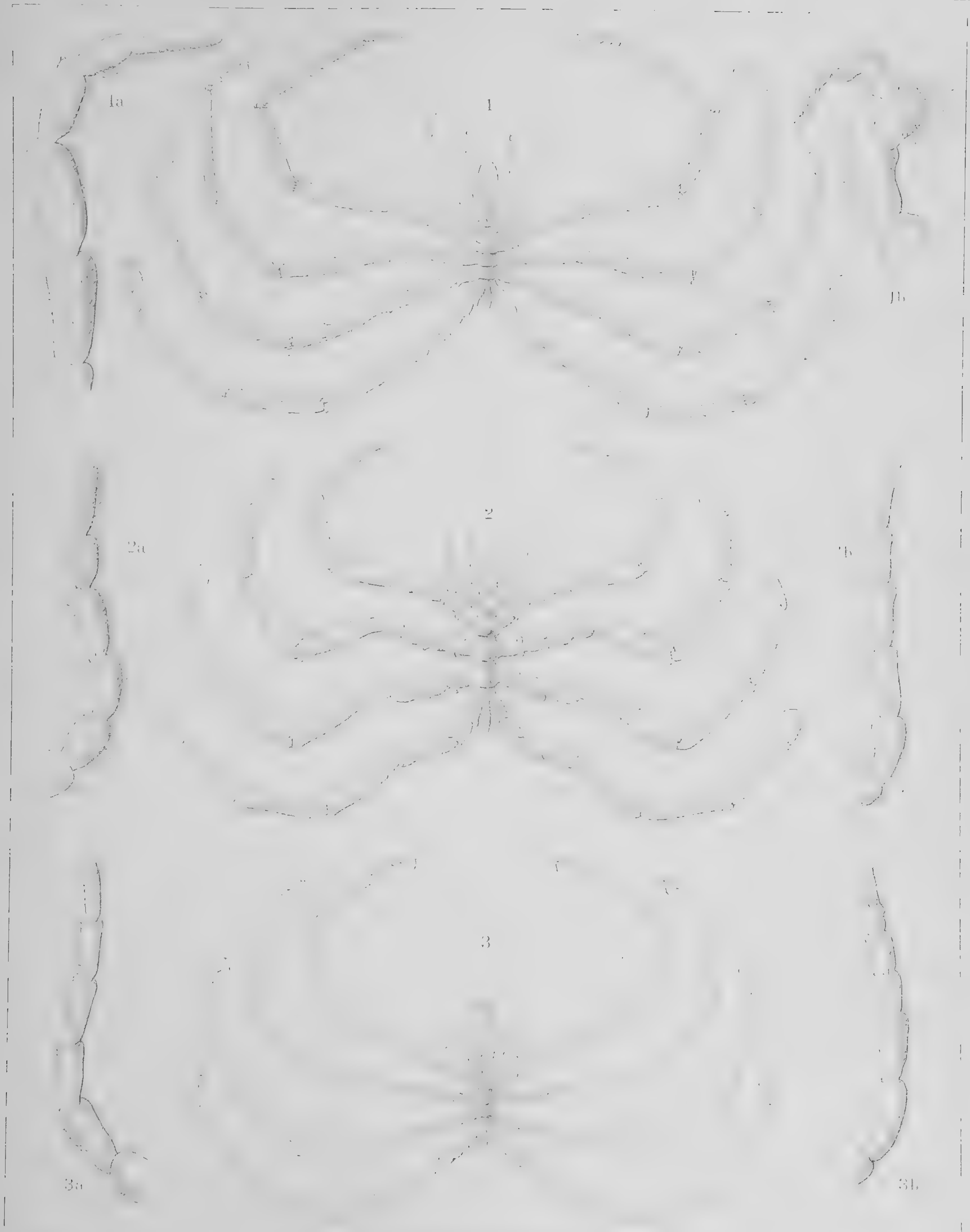
Pentanymphon antarcticum

West, Newman lith.



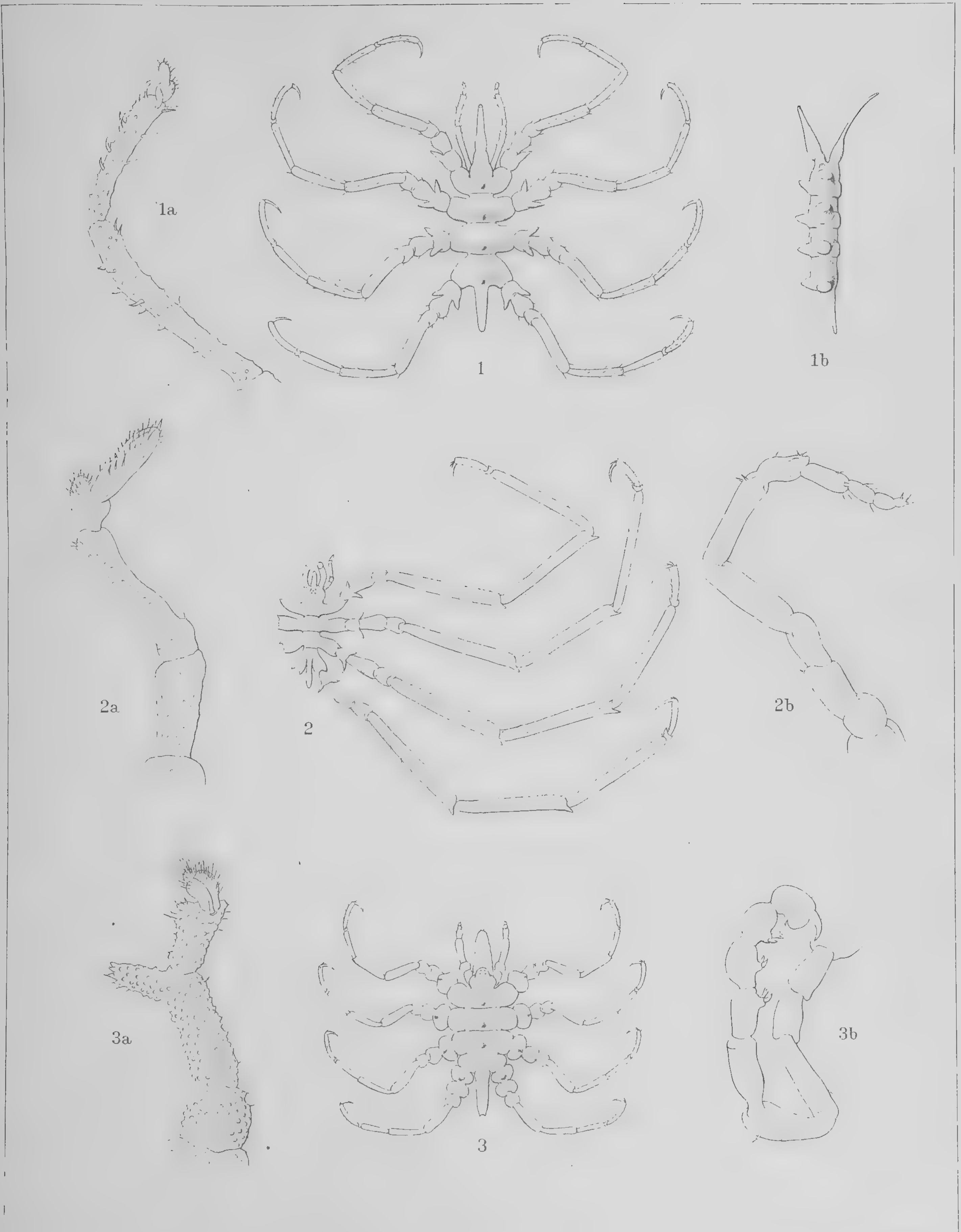
West, Newman lith.

Leionymphon.
1. L. grande. 2. L. minus.



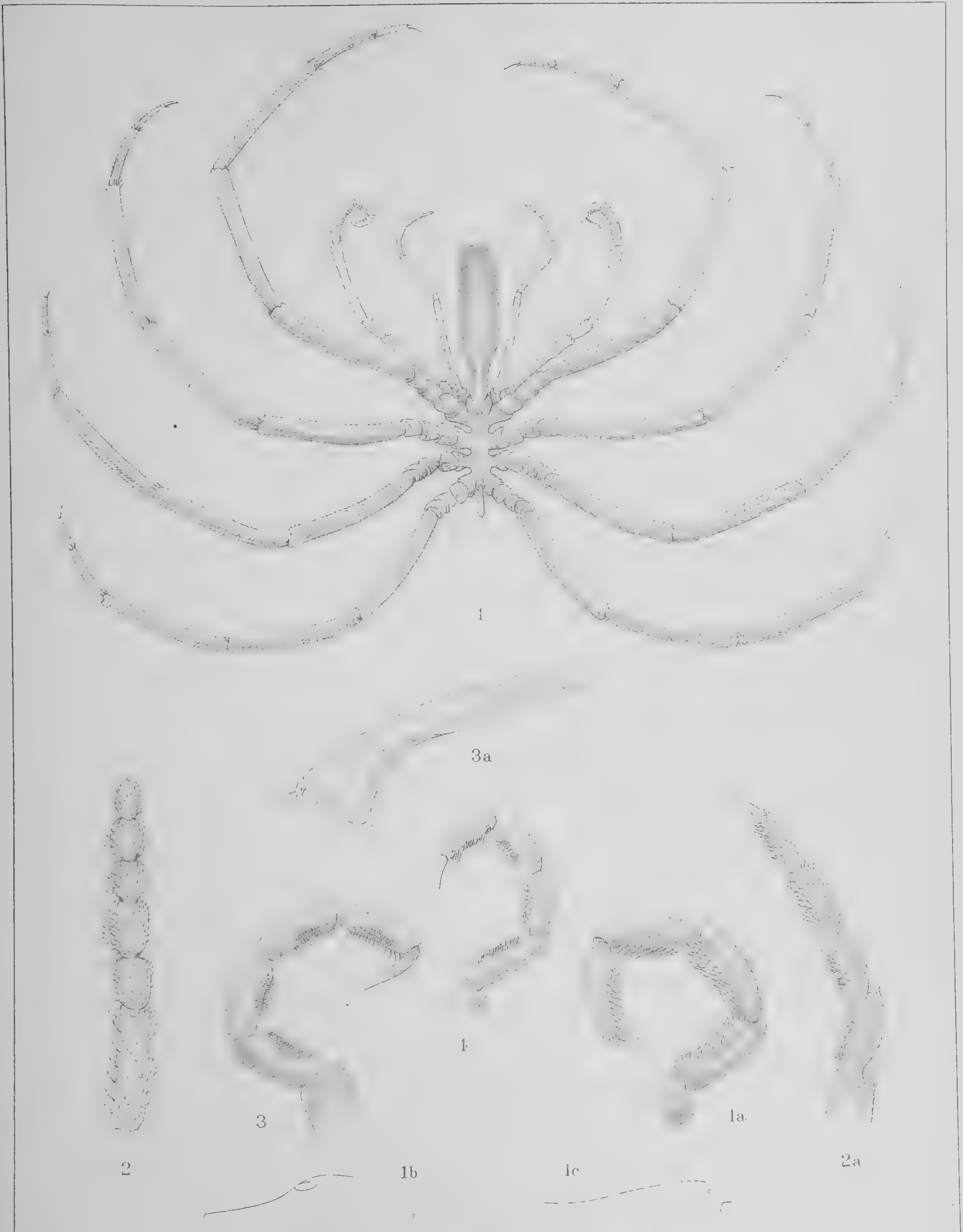
West, Newman del et lith.

Leionymphon.
1. L. australe. 2. L. spinosum 3. L. glaciale



West, Newman del. et lith.

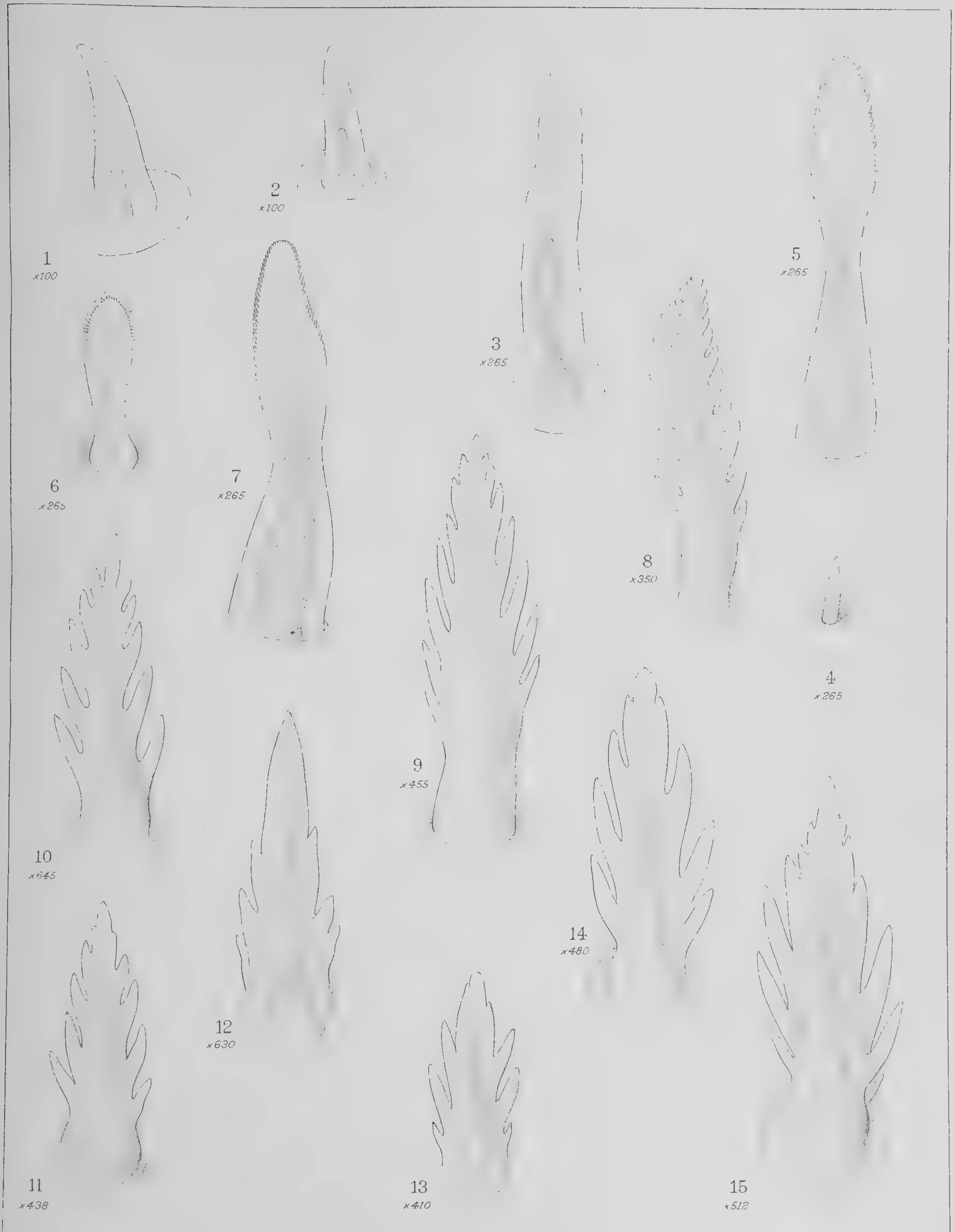
1. Austrodecus glaciale. 2. Austroraptus polaris. 3. Rhynchothorax australis.



E. W. Sexton ad nat. del. West, Newman lith.

Colossendeis.

1. C. australis 2. C. glacialis 3. C. frigida [illegible]



Figs 1-7 E.W.Sexton del. Figs 8-15 West, Newman del. et lith.

Figs 1 & 2. Colossendeis australis. Figs 3 & 4. C. glacialis. Figs 5 & 6. C. frigida. Fig. 7. C. rugosa.
Fig. 8. Nymphon hiemale. Fig. 9. N. lanare. Fig 10. N. frigidum.
Fig. 11. Chætonymphon villosum. Fig. 12. C. biarticulatum. Fig. 13. C. mendosum.

ACARI.

HALACARIDÆ (ACARIENS MARINS).

Par le Dr. E. L. Trouessart,

Professeur au Muséum d'Histoire Naturelle de Paris,
Membre Correspondant de la Zoological Society of London.

Avec 1 planche d'après les dessins de G. Neumann, Professeur à l'Ecole Vétérinaire de Toulouse.

Introduction.

En terminant l'étude des *Acariens* rapportés du Pôle Antarctique par l'expédition de la 'Belgica,' l'auteur de ces lignes disait: "Il est regrettable qu'aucune espèce d'*Halacaridæ* ne se soit rencontrée au cours des dragages opérés dans ces régions. Nous savons par les matériaux rapportés par Pouchet à la suite du voyage de la 'Manche,' et par ceux plus abondants encore, qui ont été recueillis par S. A. le Prince de Monaco, pendant la croisière de la 'Princesse Alice,' sur les côtes du Spitzberg, que les *Acariens marins* sont nombreux et d'espèces variées dans les mers arctiques. J'ai peine à croire qu'il n'en soit pas de même dans les mers antarctiques. . . ."[1]

Cette lacune se trouve aujourd'hui comblée. Les naturalistes de la 'Discovery' ont rapportés deux *Halacaridæ,* dragués au large de Granite Harbour. Tous deux appartiennent à une seule et même espèce, très intéressante, puisqu'elle se retrouve au Pôle arctique. Il est probable que l'on en découvrira d'autres par la suite.

La présence, dans les mers antarctiques, d'une espèce d'*Halacaridæ,* constituant tout au plus une sous-espèce d'un type déjà connu dans les mers arctiques (*Halacarus* [*Leptospathis*] *Alberti Trt.*), soulève une fois de plus la question de la *bipolarité des faunes.*

Je n'ai pas l'intention de revenir ici sur cette question, qui semble avoir été suffisamment discutée par Joubin,* Kœhler,† Topsent,‡ Dollo,§ Giesbrecht¶ et d'autres, et

[1] Résultats du voyage du S.Y. 'Belgica' (Zoologie, Acariens), 1903, p. 10.

* Résultats du Voyage de la 'Belgica' (Mollusques), 1903, p. 71; du même, Bull. Mus. Océanographique de Monaco, Cours d'Océanographie, 1905, p. 31, et suiv.

† Résultats, etc. (Echinides), 1901, p. 36.

‡ Résultats, etc. (Spongiaires), 1901, p. 8.

§ Résultats, etc. (Poissons), 1904, p. 191, et suiv.

¶ Résultats, etc. (Copépodes), 1902, p. 7.

que l'on peut considérer comme parfaitemente résolue, dans l'état actuel de la science. On peut la résumer ainsi :

La théorie de la *bipolarité* est démentie par les faits : toutes les espèces communes aux deux pôles sont des espèces *cosmopolites*, qui se sont propagées peu-à-peu, à travers les époques géologiques, soit par la continuité des continents ou le transport accidentel (espèces terrestres), soit par les courants ou le fond des océans (espèces marines). En définitive, la *bipolarité* n'existe pas.

Il serait trop long de citer ici toutes les espèces communes aux deux pôles : je me contenterai d'en donner quelques exemples :—

Parmi les Géphyriens, Spengel cite *Priapulus caudatus*, Lamarck.

Parmi les Mollusques, Joubin indique *Janthina rotundata.*

Parmi les Copépodes, Giesbrecht énumère les six espèces suivantes : *Oncæa conifera, O. notopus, Microstella atlantica, Oithona similis, Pseudocalanus pygmæus, Harpacticus chelifer.*

Parmi les Acariens terrestres, j'ai moi-même indiqué *Rhagidia* (ou *Nörneria*) *gigas.*

Parmi les Spongiaires, Topsent signale *Leucosolenia lamarcki, Halichondria panicea, Dendoryx incrustans.*

Or, toutes ces espèces sont cosmopolites.

Bien que *Halacarus alberti* n'ait encore été rencontré que dans les deux mers polaires, on peut prédire qu'il se retrouvera ailleurs. D'après ce que nous savons de la distribution des animaux marins, il est infiniment probable que cette intéressante espèce *existe dans plusieurs stations intermédiaires, et qu'elle est cosmopolite ou subcosmopolite.* Le fait qu'elle vit, dans les mers arctiques, à une certaine profondeur (entre 48 et 430 m.), confirme cette manière de voir. On sait, en effet, que si la température du fond descend dans les mers polaires à $-3°$, elle ne s'élève pas dans les mers tropicales au-dessus de $+2°$, et l'on peut considérer cette différence de $5°$ comme insignifiante, lorsqu'il s'agit d'animaux vivants toute l'année dans des eaux froides.

DESCRIPTION DE L'ESPÈCE ET DE SA SOUS-ESPÈCE.

Le sous-genre *Leptospathis* Trt., auquel appartient cette espèce, semble assez distinct *d'Halacarus* pour constituer un bon genre, et non plus une simple section subgénérique.

L'allongement du rostre, la forme de l'hypostome, l'absence de piquant aux palpes, la disposition de la cuirasse, la gracilité des pattes, etc., ont fourni à Lohmann[1] des caractères différentiels pour son "Chevreuxi-Gruppe," qui correspond à notre S.-G. *Leptospathis.*

La forme du rostre, et surtout la gracilité de l'hypostome, qui indiquent une différence notable dans le genre de nourriture, suffisent à caractériser ce genre.

[1] Lohmann, Die Halacarinen der Plankton Expedition, 1893, p. 58 (Plankton Expedition der Humboldt-Stiftung).

LEPTOSPATHIS.

Leptopsalis Trt., Comptes Rendus, cvii. (1888), p. 755 (non *Leptosalis* Thorell, 1882).
Chevreuxi-Gruppe Lohmann, Halacarinen Plankton Exp., 1893, p. 68.
Leptospathis, Trt. Rev. Biol. Nord., vi. (1894), p. 174.

Caractères.—Rostre grêle et allongé ; hypostome long et grêle, plus étroit à la base ou dans sa partie médiane, spatuliforme (et non triangulaire, comme chez *Halacarus* proprement dit).

Type : *Halacarus chevreuxi* Trouessart.

Le genre renferme les espèces suivantes :

1. *Leptospathis chevreuxi*, Trt.
2. „ *nationalis*, Lohm.
3. „ *hispida*, Lohm.
4. „ *panopae*, Lohm.
5. „ *hypertrophica*, Lohm.
6. „ *thaleia*, Lohm.
7. „ *alberti*, Trt.

Voici la diagnose de cette dernière espèce, telle que je l'ai donnée en 1902[1].

LEPTOSPATHIS ALBERTI TYPICA.

" Cette grande espèce est bien caractérisée par la forme de ses pattes. La cuirasse est mince et peu développée, dépourvue de crêtes et de lamelles. Le tronc est ovale, un peu lobé par l'insertion des pattes, avec l'anus terminal. La plaque de l'épistome est coupée carrément en avant, laissant le rostre à découvert; les plaques oculaires sont subovales ; la plaque notogastrique est grande, ovale ; la plaque sternale très développée, subtrapézoïdale, étroite en arrière ; les plaques coxales très larges, se rejoignent presque, en-dessous ; la plaque ventrale est petite, ronde, occupée presqu' entièrement par le cadre génital, arrondi. Toutes les plaques sont simplement granuleuses, sans sculpture. Le rostre est conformé comme chez *H.* (*L.*) *chevreuxi.* Les pattes sont longues, à articles cylindriques, avec le tarse fortement recourbé en dedans, surtout à la 4^{e} paire, et complètement dépourvu de gouttière onguéale ; la pièce médiane des griffes se termine par un *appendice bidenté énorme.* Les griffes sont presque droites jusqu'à la dent accessoire, et ne portent qu'un peigne court occupant le milieu de la branche droite, à dents souvent usées ou brisées. Le 3^{e} article des pattes est un peu renflé ; le 4^{e} est fortement échancré à sa base interne. (*Dimensions : voyez plus loin.*) Dix specimens, mâles, femelles et nymphes.

" Cette belle espèce, la plus grande du sous-genre *Leptospathis*, est dédiée à S. A. S. Albert 1er, Prince Régnant de Monaco."

La sous-espèce des mers antarctiques dépasse encore en dimensions le type du Nord : nous la décrirons sous le nom suivant :

[1] Trouessart, Bull. Soc. Zool. de France, 1902, pp. 67, 68.

LEPTOSPATHIS ALBERTI ANTARCTICA.

Très semblable au premier abord au type, mais en différant par sa taille plus grande et des proportions un peu différentes, comme l'indique le tableau suivant :

Dimensions:

	L. Alberti typica.	L. Alberti antarctica
Tronc avec le rostre	1100 μ	1200 μ
Tronc sans le rostre	900	1000
Rostre (longueur du)	200	200
1ère paire de pattes	780	890
2e	720	780
3e	760	800
4e	800	900
Largeur du tronc*	450	530
Largeur du 3e article (1e paire). .	80	60
1er et 2e articles de la 1e paire . .	120	120
3e	200	250
4e	100	120
5e	200	250
6e	150	150

N.B.—Ces dimensions varient un peu d'un individu à l'autre.

La comparaison de ces chiffres montre que la sous-espèce antarctique diffère du type arctique par : 1° une taille un peu supérieure ; 2° des pattes relativement plus longues et plus grêles (notamment le 3e article de la 1e paire) ; 3° des proportions un peu différentes des pattes : ainsi, tandis que les 1er, 2e et 6e articles de la 1e paire sont sensiblement égaux dans les deux formes, le 4e et surtout le 3e et le 5e montrent une différence notable. Cette patte s'est donc allongée surtout dans sa partie moyenne.

DESCRIPTION DE LEPTOSPATHIS ALBERTI ANTARCTICA.

Tronc.—Ovoïde, largement arrondi en avant ; le bord du camérostome presque droit transversalement, conique en arrière, où le tubercule anal forme un petit cône tronqué nettement distinct ; les flancs portent une forte échancrure au niveau de l'insertion de la 2e paire de pattes, une autre beaucoup moins marquée à l'insertion de la 4e paire.

Face dorsale : plaque de l'épistome plus large que longue, arrondie en demi-cercle en arrière, son bord postérieur dépassant un peu le niveau de la 2e paire. Plaques oculaires irrégulièrement triangulaires, à bords arrondis, saillantes sur leur bord antéro-

* Avant la compression dans la préparation. Après compression, on trouve 500 et 600 μ environ.

externe, qui porte deux lentilles oculaires. Plaque notogastrique en ovale allongé, largement séparée des autres, ne couvrant que le milieu de la région, son bord postérieur atteignant la base du tubercule anal.

Face ventrale: plaque sternale large, s'étendant latéralement jusqu'à la base des deux premières paires de pattes, son bord antérieur fortement échancré en demi-cercle par l'ouverture du camérostome, arrondie en arrière, et ne dépassant pas la 2^e paire de pattes. Plaque ventrale courte et peu large, mais se prolongeant sous le cône anal et presqu'entièrement occupée par le cadre génital, qui est grand, arrondi, un peu ovalaire chez la femelle ; plus large, circulaire, chez le mâle. Chez la femelle, il porte six paires de poils insérés en-dedans du cadre ; chez le mâle il présente une double couronne de poils. Plaques coxales grandes, triangulaires. Téguments très finement plissés dans l'intervalle des plaques et portant, sur les flancs, des poils assez forts, savoir : un en avant de la plaque oculaire ; trois en avant de la 3^e paire de pattes ; deux en avant de la 4^e ; un à la base du cône anal.

Rostre.—A base hémisphérique formant calotte à la face dorsale, plus large que longue. *Palpes* deux fois plus longs que la base, et dépassant l'hypostome de la longueur du dernier article ; présentant la forme caractéristique du G. *Leptospathis,* c'est-à-dire parallèles, à 3^e article faiblement fusiforme, plus long que la moitié du palpe tout entier, le 4^e trois fois plus court, le 5^e et dernier un peu plus long, conique avec une petite pointe grêle. Un poil rigide, long, et grêle, dirigé en avant à l'extrémité interne du 3^e article.

Pattes.—Décroissant de longueur dans l'ordre suivant ; 4^e, 1^e, 3^e, 2^e. — 1ère *paire:* accolée au rostre, longue et grêle (voyez les dimensions au tableau, page 43) ; les deux premiers articles courts, piriformes, le 3^e allongé, faiblement renflé à son extrémité ; le 4^e assez court ; le 5^e aussi long que le 3^e ; le 6^e (tarse) plus grêle, un peu recourbé en dedans, sans échancrure onguéale, terminé par des griffes longues, faiblement recourbées, ne portant de peigne que dans la partie médiane (ce peigne a 8 à 13 dents au plus). Pièce médiane des griffes grande et forte, bidentée. Une touffe de cirrhes en-dessous de l'extrémité du tarse. Les poils que portent les pattes sont tous grêles. — 2^e *paire:* semblable à la 1^e, mais plus courte et un peu plus grêle ; le 3^e article, notamment, et le 5^e sont manifestement plus courts qu'à la 1^e paire. — 3^e *paire:* insérée un peu en arrière du milieu du tronc ; plus longue que la 2^e, le tarse plus allongé. — 4^e *paire:* insérée très en arrière, la plus longue de toutes, le tarse plus fortement recourbé en dedans, le 5^e article portant sur son bord interne trois poils à base *en chandelier,* c'est-à-dire insérés sur une petite saillie en forme de bobèche. La pièce médiane du tarse beaucoup plus forte qu'à la 1^e paire.

Différences sexuelles.—La femelle ne diffère du mâle que par la forme de l'organe génital, la disposition et le petit nombre des poils qui l'entourent.

Couleur.—Cette sous-espèce est d'un brun plus foncé que le type du Nord, ce qui peut tenir au genre de nourriture.

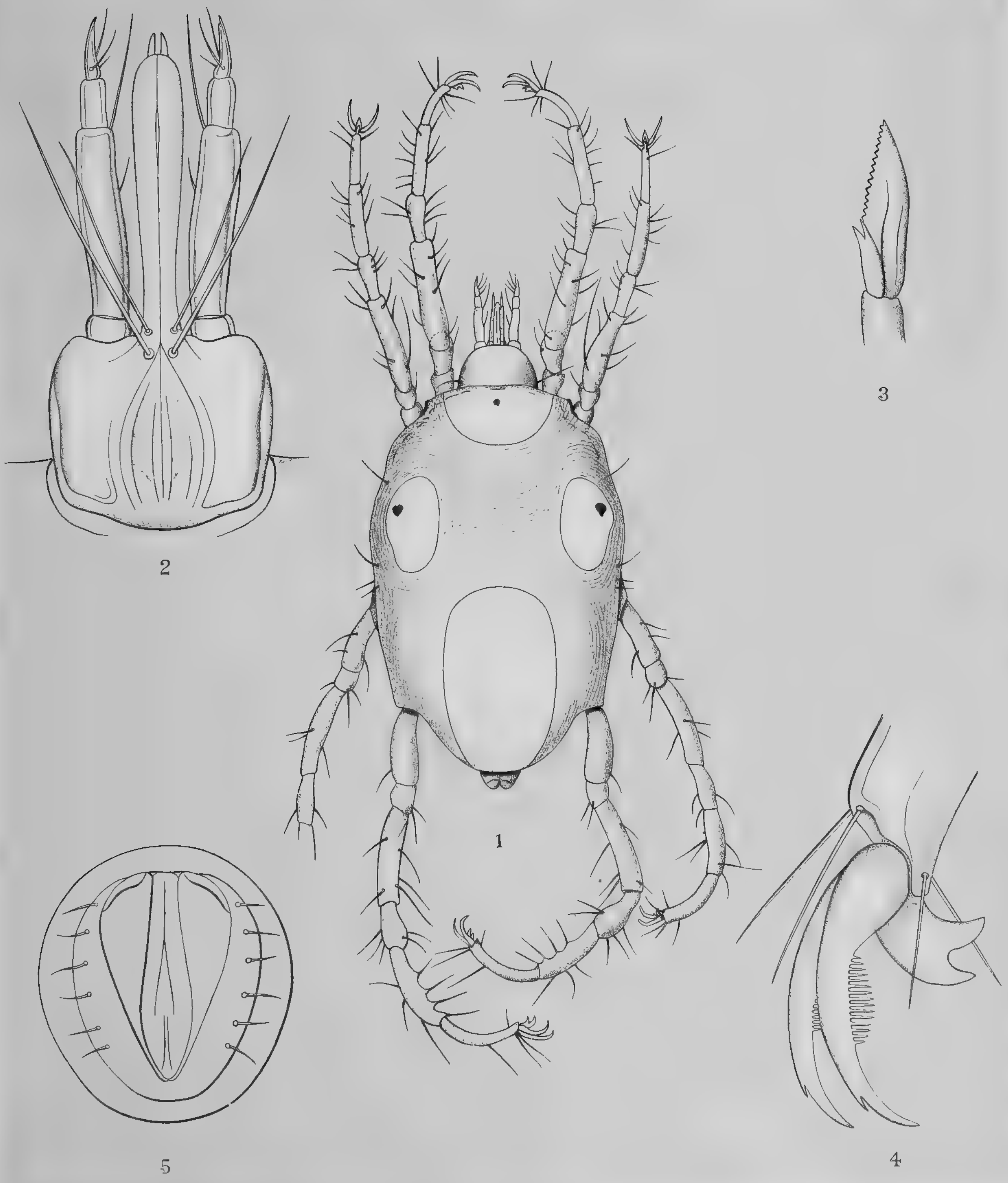
Dimensions.—(Voyez le tableau, page 43.)

Nymphes.—De forme elliptique ou naviculaire, les pattes relativement plus courtes, surtout celles de la 4ᵉ paire (d'après le type du Nord).

LÉGENDE DES FIGURES.

PLANCHE.

Fig. 1. *Leptospathis alberti antarctica*, Trt., adulte ♀, face dorsale × 90.
„ 2. Le même, rostre, face ventrale × 450.
„ 3. Le même, extrémité des chélicères × 660.
„ 4. Le même, extrémité du tarse et griffes de la 4ᵉ paire × 660.
„ 5. Le même, organe génital (femelle) × 350.



Antarctic (Discovery) Exp.

Aut.del. West, Newman lith.

Leptospathis Alberti antarctica

CHAETOGNATHA.

WITH A NOTE ON THOSE COLLECTED BY H.M.S. 'CHALLENGER' IN SUBANTARCTIC AND ANTARCTIC WATERS.

By G. Herbert Fowler, B.A., Ph.D., F.L.S.

(1 Chart.)

I.—THE COLLECTION OF THE 'DISCOVERY.'

The specimens mentioned below include all those taken south of 40° S., a parallel selected to include what appear to be the critical temperatures which separate a temperate and subantarctic plankton from truly Antarctic forms. The material was preserved in alcohol, and was mostly in fair condition, but presented the usual disadvantages which attend upon the use of this reagent for Chaetognatha.

Only three species were represented. The tables of formulæ,* given under each species, serve to show the relation between the more obvious variations which occur in these southern specimens and those in specimens from other localities. In these tables the first column of figures gives the total length in millimetres (including the tail fin); the second, the length of the tail expressed as a percentage of the total length; the third, the number of jaws; the fourth, the number of anterior teeth (or of the only row of teeth in the case of *Krohnia*); the fifth (when present), the number of posterior teeth.

Sagitta hexaptera.

Sagitta hexaptera, D'Orbigny, Voyage dans l'Amérique méridionale. Tome V., 3me partie; Mollusques, p. 143. (1835–1843.)

The species was represented by numerous specimens. They agreed with typical *hexaptera* in almost every one of such diagnostic features as they had retained, the exceptions being that the anterior fin appeared to extend slightly further forward than is usually the case (due possibly to imperfect preservation), and that the first (newest) jaw hardly showed the usual ridge and bay just below the tip; the extent to which

* The latest papers on Chaetognatha, summarising the distribution and literature of the group, are: "Biscayan Plankton collected during a cruise of H.M.S 'Research,' 1900, Part III.—The Chaetognatha"; Transactions of the Linnæan Society, 2nd Series, Zool., Vol. X., pp. 55–87; and "Reports of the 'Siboga' Expedition. Monograph XXI., The Chaetognatha" (Leiden, 1906).

this latter is developed, however, varies much in specimens from other localities. There seems no reason to regard these two points as sufficiently important to justify the separation of Antarctic specimens from D'Orbigny's species.

Formulæ, based on thirty-four specimens :—

75	13	7–8	4–5	8–9
55	15–18	7	4–5	7–9
51	?	8–9	5	7
50	? 14	8	7	7
47	14–17	6–8	4–5	7–9
43	13–15	7–8	3–5	5–7
39	15	8–9	4	6–7
38	15	8	5	6
34	15	8	3	5–6
33	18	7–8	4–5	6–7
? 31	?	9	4	7
30	16	8–9	4–5	7
29	16–17	7–9	4–5	4–7
28	19-21	7–9	4	5–6
27	18	9	3	3–4
26	19	8–10	3–4	4–6
24	16–20	8–9	4	4–5
23	22	10–12	3–4	5
21	21	10	4	3
19	21	7–9	2	3
17	20	9	3	2
16 [ca.]	?	7	4	5
15	23	8–9	3	3

Sagitta serrato-dentata.

Sagitta serrato-dentata, Krohn, Archiv für Naturgeschichte xix. (1853), p. 272.

As will be shown below, this is not a truly Antarctic form. It appeared to be male-ripe at about 12 mm. of total length; no really female-ripe specimens occurred.

Formulæ, based on 8 observations :—

13	27	7	6	10
12	33	7	5–6	8–11
11	36	7	4–5	9–10
10	40	7	4	6
9	?	7–8	4	7

Krohnia hamata.

Sagitta hamata, Moebius, Zoologische Ergebnisse der ['Pommerania'] Nordseefahrt: Vermes. Jahresbericht der Commission zur wissenschaftlichen Untersuchung der Deutschen Meere, Jahrgang II., III. (1875), p. 158; pl. iii., fig. 13–16.

Quite typical specimens of this species were captured, sometimes in large numbers, but the majority were small and immature specimens, under 15 mm.

Formulæ, based on 21 specimens:—

31	24	7–8	19–20
26	23	8–9	15
21	18–28	6–9	12–23
c. 20	?	8	13
19	26	9	14–16
17	23–29	7–9	6–11
c. 15	26	7–8	6–10
14	25	8	4
11	27	8	5–6
9	30	8	4

The occurrences of these species at the various stations are presented below in tabular form.

Date.	Position.	Hole.	Depth (fm.).	Sagitta hexaptera.	Sagitta serratodentata.	Krohnia hamata.	Temperature C°.
Oct. 19, 1901 . . .	40° 12′ S., 32° 27′ E.	—	0	1	20	—	12° 4 to 9° 4
Oct. 22, 1901 . . .	45° 00′ S., 40° 57′ E.	—	0	1	9	—	4° 4
Oct. 23, 1901 . . .	45° 08′ S., 44° 47′ E.	—	0	10	—	—	4° 4
Nov. 5, 1901 . . .	48° 44′ S., 100° 16′ E.	—	0	11	—	—	5° 3 to 3° 4
Nov. 11, 1901. . .	51° 20′ S., 126° 23′ E.	—	0	2	1	—	4° 6
Nov. 21, 1901. . .	56° 31′ S., 156° 19′ E.	—	0	1	—	—	1° 1
Nov. 22, 1901. . .	56° 31′ S., 156° 19′ E.	—	0	11	—	43	3° 6
Nov. 23, 1902. . .	77° 49′ S., 166° 00′ E.	4	8	1	—	—	−1° 9
Dec. 1, 1902 . . .	.. ..	4	7	1	—	—	−1° 9
Dec. 8, 1902 . . .	.. ..	4	6	1	—	—	−1° 6
Dec. 14, 1902 . . .	.. ..	4	6	1	—	—	−1° 6
Mar. 21, 1903. . .	.. ..	4	6	1	—	—	−1° 9
Mar. 25, 1903. . .	.. ..	4	5	1	—	—	−1° 9
Mar. 27, 1903. . .	.. ..	8	10	1	—	—	−1° 9
May 5, 1903 . . .	.. ..	8	10	2	—	—	−1° 9
May 6, 1903 . . .	.. ..	4	5	1	—	1	−1° 9
May 9, 1903 . . .	.. ..	4	5	3	—	—	−1° 9
May 13, 1903 . . .	.. ..	8	10	2	—	—	−1° 9
May 16, 1903 . . .	.. ..	4	5	1	—	1	−1° 9
May 29, 1903 . . .	.. ..	4	5	3	—	—	−1° 9
June 1, 1903 . . .	.. ..	8	10	5	—	1	−1° 9
June 28, 1903. . .	.. ..	8	10	—	—	3	−2° 0
July 13, 1903 . . .	.. ..	8	10	2	—	3	−2° 0
Aug. 13, 1903. . .	.. ..	8	10	1	—	2	−1° 9
Aug. 21, 1903. . .	.. ..	8	10	1	—	6	−1° 8
Aug. 27, 1903. . .	.. ..	8	10	1	—	3	−1° 8
Sept. 9, 1903 . . .	.. ..	8	btm.	—	—	1	−1° 8
Sept. 18, 1903. . .	.. ..	8	10	1	—	—	−1° 8
Nov. 2, 1903 . . .	.. ..	12	10	—	—	2	−1° 8
June 21, 1904. . .	56° 12′ S., 136° 18′ W.	—	10	3	—	60	3° 0
June 24, 1904. . .	58° 49′ S., 124° 48′ W.	—	5	3	—	159	? 2° 7
June 25, 1904. . .	59° 19′ S., 120° 24′ W.	—	5	1	—	71	2° 2
June 28, 1904. . .	59° 34′ S., 106° 28′ W.	—	5	2	—	90	2° 2
July 1, 1904 . . .	55° 44′ S., 95° 43′ W.	—	5	3	—	61	5° 3

II.—THE COLLECTION OF H.M.S. 'CHALLENGER' IN ANTARCTIC AND SUBANTARCTIC WATERS.

Some six years ago Sir John Murray, K.C.B., kindly sent to me the Chaetognatha collected by H.M.S. 'Challenger' in 1873–1876. Captured at a date when methods of preservation (especially of plankton) had not been so carefully studied as of later years, and having lain for thirty years in alcohol, the specimens are, naturally enough, by no means in a condition to allow of a general report on the collection. So far, however, as could safely be done, I have attempted to identify the more characteristic species taken in nine hauls at the surface, which lay either in the cruise to the Antarctic or towards the subantarctic Patagonian region. These nine were the only hauls available in what may be termed the critical latitudes. They were studied mainly with the idea of finding approximately the northern limit of *K. hamata* at the surface, and the southern limit of *S. serratodentata*, the former being bipolar in the strictest sense, the latter being believed to be tropical, temperate, and subpolar only. They appropriately supplement the collection of the 'Discovery.'

A considerable number of the specimens were in a hopeless condition; only those are listed here of the identification of which the writer felt reasonably certain. As to the records of *K. hamata* and *S. serratodentata*, there can be practically no doubt, but *S. hexaptera* is less certain, and *S. Zetesios* (?) least certain of all.

The species noticed in these hauls of the 'Challenger' were the same as those taken by the 'Discovery,' with one addition.

Sagitta hexaptera, d'Orbigny.

Formulæ, based on thirteen specimens:—

31	16	10	5	6–7
26	17	10	5	6
25	16	9	4	5–6
21	13–16	8–10	4–5	4–5
18	21–22	8–11	4	5–7
16	18	9	3	2
15	20	10–11	3–5	2–6
11	25	9–10	3	2
10	?	8–10	3	2–3

Sagitta serratodentata, Krohn.

Formulæ, based on thirty-one specimens:—

16	31	6–7	5	9
15	26–33	7–8	4–5	6–10
14	27–32	7–8	3–6	8–12
13	27–30	6–7	5–6	9–14
12	25–33	7	4–5	7–13
11	27–32	7–8	3–6	8–12
10	25–30	6–7	3–6	7–13
9	27–33	6–7	2–4	4–8
8	25–34	7	3–6	3–10

Sagitta zetesios.

Sagitta zetesios, Fowler, Transactions of the Linnean Society, 2nd Series, Zoology, x. (1905), p. 67.

To this species I refer, with very great hesitation, three specimens from temperatures below zero (Centigrade). The numbers, the size, and the shape of the teeth and jaws agreed fairly well with those of specimens already described, but the specimens were in far too battered a condition for the determination to be reliable.

Formulæ :—

12 [ca.]	?	9	6	13–14
10	30	8–9	5	11–12
9	33	9	5	8–9

Krohnia hamata, Moebius.

These specimens were quite unmistakable. In some of the younger specimens the older jaws showed the characteristic sagination figured by Strodtmann and myself in northern specimens.

Formulæ, based on twenty specimens :—

17	21	7–8	8–9
15	20–23	7–9	7–13
14	25	8	? 6
13	26	6–7	9
12	25–29	7–9	7–10
11	22–27	6–9	? 4–12
10	30	7–8	? 3–7

The actual observations are as follows. They have been arranged in order of decreasing temperatures, which agrees, except for a single entry, with the order of increasing latitude.

Station.	Date.	Position.	Temperature. Centigrade.	Krohnia hamata.	Sagitta serratodentata.	Sagitta hexaptera.	Sagitta Zetesios (?).
299	Dec. 14, 1875 .	33° 31′ S., 74° 43′ W.	15° to 16° 6	—	1	7	—
302	Dec. 28, 1875 .	42° 43′ S., 82° 11′ W.	12° 7	11	17	6	—
303	Dec. 30, 1875 .	45° 31′ S., 78° 9′ W.	12° 2	4	77	4	—
159	Mar. 9 & 10, 1874	47° 25′ S., 130° 22′ E.	10° 5	24	1	3	—
146	Dec. 29, 1873 .	46° 46′ S., 45° 31′ E.	6° 1	80	—	2	—
nr. 150	Feb. 3, 1874 . .	52° 4′ S., 71° 22′ E.	2° 7	4	—	—	—
156	Feb. 26, 1874 .	62° 26′ S., 95° 44′ E.	0° 5	9	—	—	—
154/5	Feb. 21, 1874 .	64° 27′ S., 90° 48′ E.	−0° 3	1	—	5	1
153	Feb. 14, 1874 .	65° 42′ S., 79° 49′ E.	−1° 6	18	—	1	2

III.—DISTRIBUTION.

The occurrence of these species in really polar waters is of considerable interest.

The record of *Krohnia hamata* as a truly "bipolar" species is thus completed; it ranges from 81° 30′ N. (Römer and Schaudinn) to 77° 49′ S.; it is both epiplanktonic and mesoplanktonic at high latitudes with low surface temperatures, but in tropical and warm temperate seas is known only from the colder strata of the mesoplankton. While, horizontally speaking, it appears to be cosmopolitan, and is fairly eurythermal, it has not been recorded definitively from a higher temperature than 12·7° Cent. ('Challenger' Collection).

As to *Sagitta hexaptera*, the captures of both 'Discovery' and 'Challenger' complete its record as a "pantothermal" species, that is to say, one living at practically every known sea-temperature, from about 29° C. to − 2° C.; and as a truly cosmopolitan species, ranging from Spitsbergen in the north to the 'Discovery's' winter quarters in the south, and from every sea from which Chaetognatha have been recorded.

Sagitta serratodentata, on the other hand, failed at the colder stations of both 'Discovery' and 'Challenger'; its minimum record † has now been reduced to 4·6° C., the lowest temperature at which it had been taken previously being between 6·6° and 12·2° C. at the Falkland Islands. Its definitive temperature limit in the Northern Hemisphere is at present 12·2° C., but in view of the 'Discovery's' captures it may possibly prove to extend somewhat further north than its present record of lat. 60° 12′ N. At any rate, it seems to be clear that it is not "bipolar," although subantarctic and north-temperate.

The southern captures of *hexaptera*, *serratodentata*, and *hamata*, from all sources, have been plotted on the appended circumpolar chart, together with the mean annual surface isotherms of 12° and 6° C., as calculated by Dr. Schott. The former appears to indicate approximately the northerly limit of *hamata* as an epiplanktonic form, the latter similarly to indicate the southerly limit of *serratodentata*.

The definitive temperature limits given in the 'Siboga' Report already cited require amendment as follows:—*hexaptera*, lowest temperature, − 2° C.; *serratodentata*, lowest temperature, 4·6° C.; *hamata*, highest surface temperature, 12·7° C., lowest temperature, − 2° C.

† This record is, however, of a single specimen, and the species had failed at the two previous stations (compare p. 3 above). It is therefore possible that we are dealing merely with an isolated specimen, which had drifted beyond its natural limits.

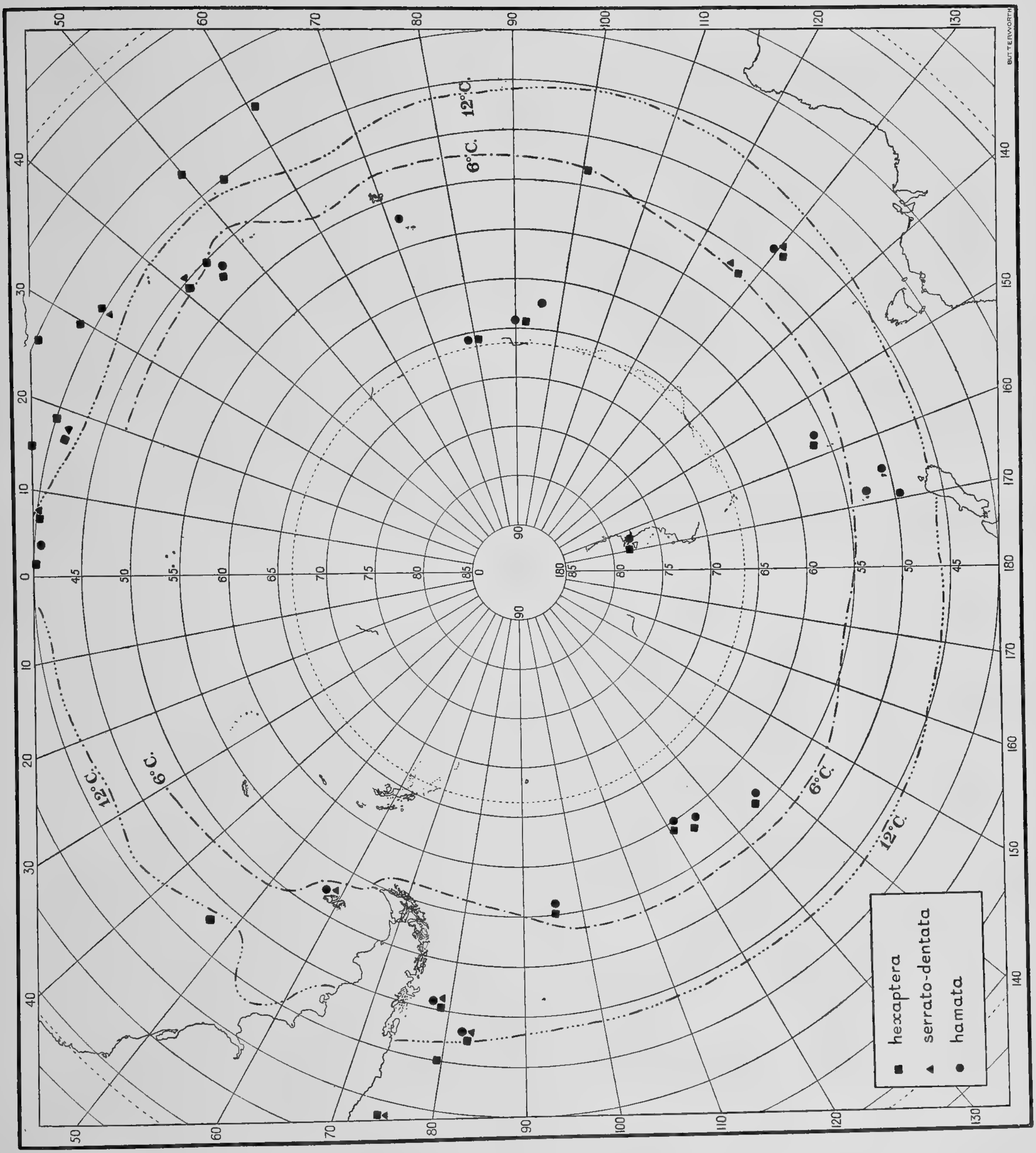


CHART OF THE ANTARCTIC REGION, SHOWING THE RECORDED OCCURRENCES OF THE THREE TYPICAL SPECIES OF CHÆTOGNATHA; AND THE APPROXIMATE NORTHERN LIMITS OF HAMATA AS A SURFACE FORM (ISOTHERM OF 12·0 C.), AND OF SERRATO-DENTATA (ISOTHERM OF 6° C.) ARE ALSO SHOWN.

NEMATODA.

VON DR. V. LINSTOW.

(1 Plate.)

LEPTOSOMATUM AUSTRALE.

Gesammelt bei Hut Point, September 24th, 1902.

DIESE Art ist die grösste aller bekannten freilebenden Nematoden; das Weibchen erreicht eine Länge von fast 50 mm.; die Farbe der Spiritus-Exemplare ist gelblich-braun. Der Körper ist lang gestreckt und schlank; die Breite verhält sich zur Länge wie 1 : 82–88; das Kopfende ist stark verdünnt, das Schwanzende nur wenig und in beiden Geschlechtern abgerundet. Die Cuticula ist sehr dick, 0·0156 mm. breit, und mehrschichtig, die äussere Lage färbt sich schwach durch Borax-Carmin, die innere nicht; eine Querringelung fehlt; am Kopfende trägt die Cuticula 14 Längsreihen kurzer, breiter Dornen oder Borsten, die theils senkrecht von ihr abstehen, theils gekrümmt und mit der Spitze nach vorn gerichtet sind; nach hinten werden sie immer sparsamer und verschwinden etwa 1·2 mm. vom Kopfende entfernt ganz, am Schwanzende treten sie in ähnlicher Weise wieder auf; sie stehen einzeln oder zu zweien oder dreien neben einander.

Das Kopfende ist gerade abgestutzt; 0·023 mm. vom Scheitel entfernt steht ein Kranz von 10 Borsten oder Stacheln, in den Seitenlinien je eine einfache, in den Submedianlinien doppelte; dicht dahinter bemerkt man jederseits in den Seitenlinien ein Seitenorgan; 0·25–0·28 mm. vom Scheitel finden sich 2 dunkle Augenflecke.

Von der Subcuticula erheben sich nach innen 4 Längswülste, ein dorsaler, ein ventraler und zwei laterale; im Kopf- und Schwanzende sind sie mächtig entwickelt, im langen, mittleren Körpertheil aber wird ihre Höhe sehr verringert; ihre Mächtigkeit ist hier nur $1\frac{1}{2}$–2 mal so stark wie die Dicke der Cuticula. Der Dorsalwulst ist am schmalsten, und wird in der Mitte des Körpers wie der Ventralwulst zu einem schmalen, die Muskulatur trennenden Kamm reducirt; Dr. de Man* findet in seiner vortrefflichen Arbeit über die auf der Reise der "Belgica" gefundenen Nematoden bei den verwandten Arten *Thoracostoma setosum* v. Linst. gar keine Dorsal- und Ventralwülste. Die Seitenwülste sind stark entwickelt und nehmen jeder etwa $\frac{1}{10}$–$\frac{1}{9}$ der Körperperipherie ein; sie bestehen aus einem dorsalen, einem mittleren und einem ventralen Theil und sind überall mit Zellen durchsetzt, welche grosse, theils blasse, theils schwarz pigmentirte Kerne und vielfach Kernkörperchen

* de Man, Résultats du voyage du S. Y. Belgica en 1897–1899, Zoologie, Nématodes libres, Anvers, 1904, pag. 26, tab. vii., fig. 8 j.

enthalten. Der dorsale und ventrale Theil werden von gestreckten kolbenförmigen Strängen gebildet, wie sie im Querschnitt erscheinen, auch die in ihnen liegenden Zellen sind länglich rund, während die Zellen des mittleren Theils meistens kugelrund sind. Der Ventralwulst ist stärker als der dorsale; er wurzelt auf der Subcuticula mit schmaler Basis und verbreitet sich nach innen, aber nur im Kopfende; im grossen mittleren Körpertheil ist er nur eine schmale Leiste; ganz vorn, in der Nähe der Augenflecken, sind alle 4 Längswülste geschwunden und die Muskulatur bildet einen zusammenhängenden Ring auf Querschnitten.

In der Leibeshöhle, zwischen den Muskeln und den Längswülsten einerseits und dem Verdauungstract und den Geschlechtsorganen andererseits liegen zahlreiche freie Zellen, eiförmig oder kugelrund, mit grossem, theils blassem, theils schwarz pigmentirtem Kern, oft mit Kernkörperchen, welche den Zellen der Seitenwülste durchaus gleichen; besonders zahlreich und dicht gedrängt finden sie sich vorn und hinten im Körper, im Kopf- und Schwanzende, besonders grosse, die 0·048 mm. lang und 0·044 mm. breit sind, sieht man 0·30–0·48 mm. von einander entfernt, hinter einander liegen; die durchschnittliche Grösse ist 0·026 mm. und die des Kerns 0·014 mm.

Die 4 Längswülste theilen die Längsmuskeln in ebenso viele Felder; im Kopf- und Schwanzende ist die Muskulatur mächtig entwickelt, bis 0·039 mm. dick, während sie im übrigen Körper nur $1\frac{1}{2}$–2 mal so dick ist wie die Cuticula; am männlichen Schwanzende stehen parallele Muskelzüge, die schräg von vorn und der dorsalen nach hinten und der ventralen Seite ziehen.

Im Kopfende sieht man 2 dunkle Augenflecke, die nicht in der Cuticula liegen, sondern der Aussenseite des Oesophagus eingepflanzt sind; sie sind rothbraun und stehen 0·15 mm. vom Scheitelpunkt entfernt; sie finden sich aussen von den dorsolateralen Schenkeln des dreischenkligen Oesophagus-Lumen und bestehen aus je einer Linse, die innen von einem Pigmentbecher umfasst wird. Zur Perception von Bildern können diese unter der dicken Cuticula und der starken Muskulatur liegenden Sehorgane wohl nicht dienen, wohl aber, wie bei *Epibdella*, wo 4 Ocellen mitten im Gehirn liegen, zur Unterscheidung von Hell und Dunkel. Auch de Man * findet bei *Thoracostoma setosum* v. Linst. und *Thoracostoma antarcticum* v. Linst. die Augenflecke an der Aussenseite des Oesophagus, aber nicht dorsolateral, sondern, wie es scheint, lateral.

Der Oesophagus nimmt beim Männchen $\frac{1}{8\cdot8}$, beim Weibchen $\frac{1}{10\cdot7}$ der ganzen Thierlänge ein; das Lumen ist dreischenklig und der eine Schenkel ist, wie in der Regel, ventral gerichtet; Längsmuskelzüge, die radiär gestellt sind, durchziehen das ganze Organ und dienen durch Erweiterung des Lumens zum Ansaugen von Nahrung; 3 lange Drüsen, 1 dorsal, 2 ventrolateral, durchziehen den Oesophagus der ganzen Länge nach; am Kopfende bilden sie erweiterte Ausmündungsgänge, die 0·12 mm. vom Scheitelpunkt in das Oesophaguslumen einmünden.

* Op. cit. pp. 31 u. 39, tab. x. fig. 9, f.

Der Darm besitzt eine dicke Tunica propria; das Epithel wird von breiten Zellen gebildet, die eine Längsstreifung zeigen und einen bald blassen, bald schwarz pigmentirten Kern enthalten.

Ein Nervenring umgiebt den Oesophagus 1·18 mm. vom Kopfende, etwa an der Grenze von dessen 1. und 2. Viertel: seine Dicke beträgt 0·018 mm. und er enthält ovale, 0·0156 mm. lange und 0·0104 mm. breite Ganglienzellen.

Leimdrüsen, welche bei anderen freilebenden Nematoden am Schwanzende münden, fehlen hier ganz, der Raum hinter dem Anus ist von Zellen der Seitenwülste erfüllt.

Das Männchen wird 37·7 mm. lang und 0·46 mm. breit; der Schwanz macht $\frac{1}{191}$ der ganzen Länge aus; 0·26 mm. vor der Cloakenöffnung in der Mittellinie mündet die Präanaldrüse in einer rundlichen Vorragung des Körpers, die eine becherartige Öffnung trägt; in diese mündet die kolbenförmige, 0·16 mm. lange und 0·034 mm. breite Drüse; die beiden Cirren sind sichelförmig gekrümmt und in der Mitte verdickt, ihre Länge beträgt 0·22 mm.; dorsal von ihnen liegt ein 0·18 mm. langer, stabförmiger, an beiden Enden abgerundeter Stützapparat; die Hoden erfüllen die hinteren $\frac{4}{9}$ des Körpers; Papillen fehlen ganz.

Das Weibchen erreicht eine Länge von 49·5 mm. und eine Breite von 0·56 mm.; das Schwanzende nimmt $\frac{1}{209}$ der ganzen Länge ein; auch hier sind die Geschlechtsorgane weit nach hinten gerückt: die vordere Körperhälfte beherbergt sie gar nicht; theilt man die Länge des Körpers in 10 gleiche Theile, so liegen Uterus und Ovarien im 6.–8. Zehntel; die Vulva mündet etwa an der Grenze des 2. und 3. Drittels, sie theilt den Körper im Verhältniss von 11 : 6; die Eier liegen im Uterus in einer Reihe; sie sind gross und wenig zahlreich; die grössten, welche der Vulva zunächst liegen, sind 0·79 mm. lang und 0·31 mm. breit.

Es fragt sich, welche Function die Seitenwülste und die freien Zellen haben könnten; zur Nahrungsaufnahme dienen sie offenbar nicht, da die Cuticula zu dick ist und Oesophagus und Darm eine normale Ausbildung zeigen; ein Absonderungsorgan können sie auch nicht sein, da ein Ausmündungsgang nach aussen fehlt; sie werden also eine Bedeutung für den inneren Stoffwechsel haben und halte ich es für wahrscheinlich, dass sie die Function von Lymphdrüsen besitzen.

Die parasitischen Nematoden habe ich früher * eingetheilt in Secernentes, Resorbentes und Pleuromyarii.

Secernentes sind Nematoden mit voll entwickeltem Oesophagus und Darm, welche schmale und hohe Seitenwülste besitzen, die ein Längsgefäss enthalten; die Gefässe der beiden Seiten vereinigen sich vorn in der Gegend des Oesophagus zu einem, das ventral im Porus excretorius ausmündet; die Seitenwülste scheinen die Function von Nieren zu haben; die Arten leben im Verdauungstract ihrer Wirthe.

Resorbentes wurden Nematoden mit breiten und niedrigen Seitenwülsten genannt, denen ein Gefäss und ein Porus fehlt; die Arten leben nie im Verdauungstract der Wirthe, sondern in oder an anderen inneren Organen, oft fest von Bindegewebe

* Arch. f. mikr. Anat. xlix. (1897), p. 620.

umwachsen; die Ernährung erfolgt hier offenbar durch Aufsaugung seitens der Seitenwülste durch die Cuticula hindurch.

Pleuromyarii haben statt der Seitenwülste Muskeln in der Seitenlinien.

In dieses System passen die freilebenden Nematoden nicht hinein, für die ich Abtheilung der

Adenophori aufstellen möchte. Dieselben besitzen schmale Seitenwülste mit gekernten Zellen und ohne Längsgefäss, welche als Lymphdrüsen zu functioniren scheinen; wenn ein Porus excretorius vorhanden ist, so ist er die Ausmündung einer Ventraldrüse.

ERKLÄRUNG DER ABBILDUNGEN.

c, Cuticula; *a*, Augenfleck; *n*, Nerv; *o*, Oesophagus; *d*, Darm; *m*, Muskeln; *dr*, Dorsal-; *vt*, Ventral-; *l*, Lateralwulst oder -Feld; *z*, freie Zellen; *s*, Seitenorgan; *p*, Präanaldrüse; *dm*, Drüsenmündung; *v*, Vagina; *u*, Uterus; *h*, Hoden.

FIG. 1.—Männchen, m. transversale Muskeln am Schwanzende. Vergr. $\frac{6}{1}$.

„ 2.—Weibchen. Vergr. $\frac{4}{1}$.

„ 3.—Kopfende. Vergr. $\frac{100}{1}$.

FIGS. 4–8.—Querschnitte.

FIG. 4.—Oesophagus mit der Einmündung der Drüsenausgänge in das Oesophagus-Lumen. Vergr. $\frac{150}{1}$.

„ 5.—Oesophagus mit den Augenflecken. Vergr. $\frac{150}{1}$.

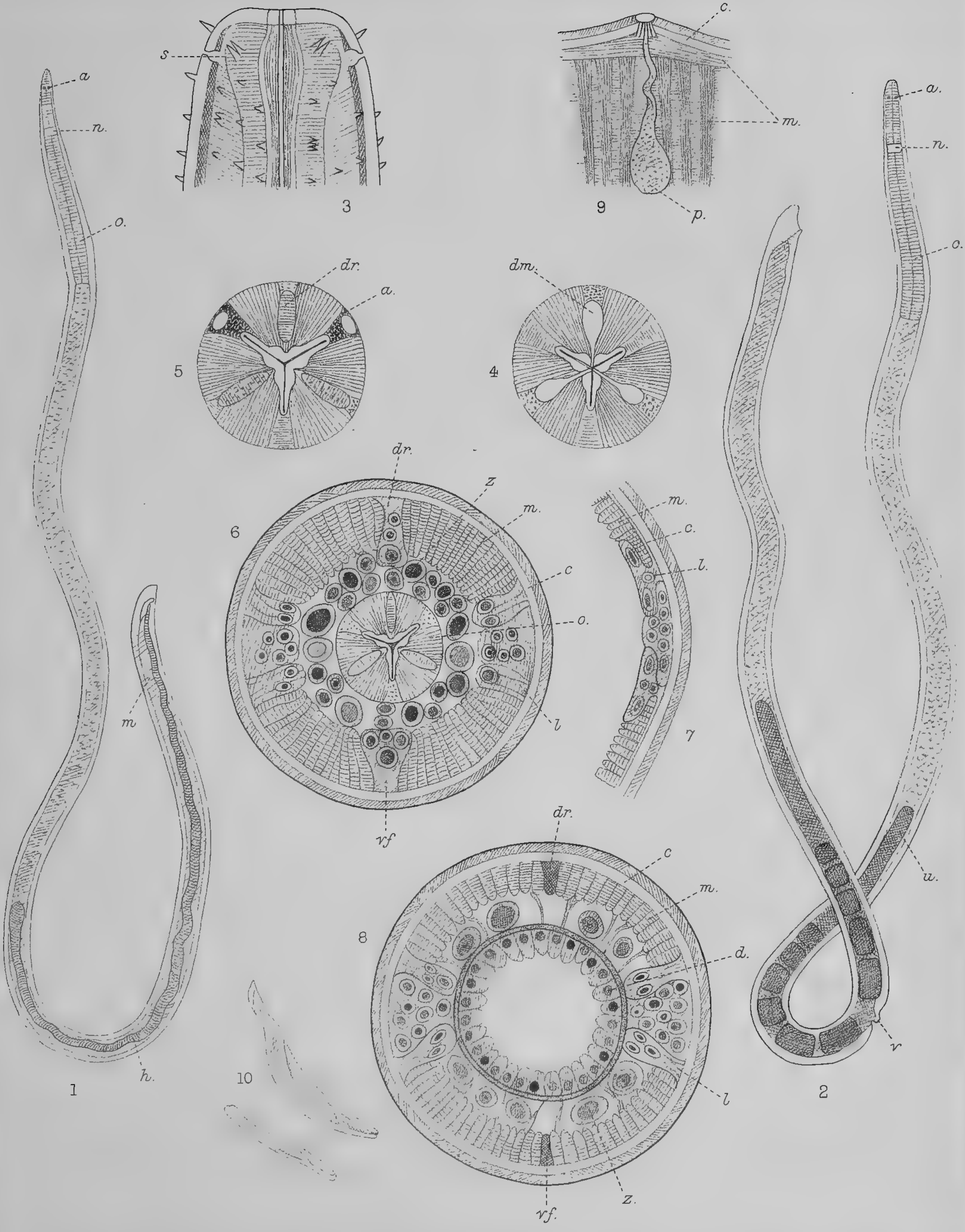
„ 6.—Oesophagus-Gegend. Vergr. $\frac{100}{1}$.

„ 7.—Mittlerer Körpertheil, Theil der Körperwandung in der Seitenlinie. Vergr. $\frac{100}{1}$.

„ 8.—Querschnitt des Weibchens hinter dem Uterus. Vergr. $\frac{100}{1}$.

„ 9.—Längsschnitt vom Männchen durch die Präanaldrüse, parallel mit derselben verlaufen transversale Muskeln. Vergr. $\frac{150}{1}$.

„ 10.—Cirrus und Stützapparat. Vergr. $\frac{160}{1}$.



Antarctic (Discovery) Exp.

Nematodes.

Aut. del. West, Newman lith.

CESTODA.

By Arthur E. Shipley, M.A., F.R.S.,

Fellow and Tutor of Christ's College, Cambridge, and University Lecturer in the Advanced Morphology of the Invertebrata.

(1 Plate.)

The only Cestodes brought back by the naturalists of the 'Discovery' were three species, all of which were found living together in the stomach of Ross's Seal, *Ommatophoca rossi.* The three differed markedly in size, in the shape, number and relative proportions of the proglottides, so that there is no doubt that we are dealing with three distinct species, and not with different stages in the growth of members of one species.

All the specimens were pickled in Perenyi's fluid, and arrived in an excellent state of preservation.

The largest of the three species is undoubtedly the same animal which Baird, in 1853, named *Bothriocephalus antarcticus.*

I give below Baird's diagnosis, and then add a few remarks upon the anatomy of the specimens.

Dibothriocephalus antarcticus.

Bothriocephalus antarcticus Baird, Proc. Zool. Soc. London, 1853, p. 25, Annulosa, pl. xxxi., fig. 4 and 4a.

"Head conical, elongated, smooth, with two lateral opposite fossettes. At the lower margin of each fossette there are two small rounded projecting lobes. Body rounded; from the neck some way downwards it is quite round or cylindrical, and the articulations are very numerous and very small, appearing like mere ridges across. Lower down, the body becomes flatter and the joints larger and more developed; lower margin thin. An impressed line runs along the centre of the body through its whole length. Length, about 9 inches; greatest breadth of body, about 3 lines."

Baird's specimens measured about 9 inches, say about 23 cms. Most of the specimens at my disposal were just under 10 cms., but a couple, apparently young, barely measured 3 cms. The specimens were obviously immature, only in the most posterior of the longer examples were uteri and ova to be found, and the latter in very small numbers; I am inclined to think also that these specimens had contracted when being killed, the anterior end of the body not being so rounded as Baird describes. The greatest breadth is 7 mm. in the largest specimen.

The body tapers anteriorly, and to a slight extent posteriorly. There is no true neck, the proglottides beginning immediately behind the head; they are at first extremely short from before backward, a feature they retain, though to a lesser degree, even at the hinder end, where it takes some three to measure a millimetre. The posterior edge of each proglottis overlaps the succeeding one to a marked extent.

The head is conical, 3 mm. in length and 3 mm. in breadth posteriorly; anteriorly it lessens to a bluntly pointed apex. Dorsal and ventral lie the two suckers. These suckers are deep, with cleanly cut edges, for the most part curled in (fig. 7), and in all cases enwrapping some foreign substance, perhaps a portion of the mucous membrane of the host.

The impressed line running along the whole body, referred to by Baird, is only on the ventral surface, and is due to the median opening of the reproductive organs and of the uterus.

The nervous system consists of two very conspicuous nerve cords, which lie parallel with the longitudinal excretory canals, and about one quarter the distance of the latter from the edge of the proglottis outside the canal. The cords fuse together in the head.

The longitudinal canals of the excretory system are also conspicuous, and are surrounded by thick walls; they break up into an anastomosing tangle of ductules in the head. There are also small canals which lie close under the surface at the edges of the proglottides, usually two at each side (fig. 2), but they also break up from time to time into twisting branchlets. The overhanging edges of the proglottides, especially of the posterior ones, are very richly supplied with water-vascular tubules. It is possible that these may have a certain hydrostatic action, and serve to erect these free edges when fluid is directed into them.

The confused meshwork of muscles in the head straighten themselves out in the neck and fall into regular rows. Of these there are six or seven dorsally and six or seven ventrally (fig. 2), but at the sides the rows tend to merge and lose their distinctness. Each row is separated from the next by very clear and distinct connective tissue fibrils running parallel with one another. The muscles in these rows consist of bundles of various sizes containing from six or seven up to fifteen or twenty fibrils. Running between every two or three of these bundles are some slight and radially arranged connective tissue fibrils, which, with the concentric fibrils of the same nature, serve to divide up the tissues into a series of little squares. No muscle fibres penetrate the parenchyma within the central area, bounded at the sides by the nerve cords and dorso-ventrally by the innermost layer of muscles.

The penis is conspicuous and very muscular, it opens in the anterior edge of the proglottis just where it joins the one in front, and is concealed by the overlapping end of the preceding proglottis. Close behind it opens the vagina, and behind this again the uterus, all in the middle ventral line. There is a large vesicula seminalis.

The testes are scattered throughout the parenchyma of the central part. The ovary is rather branching; it lies towards the posterior end of each proglottis, is deeply

stained and fairly conspicuous. The yolk-glands are widely scattered through the peripheral parenchyma.

The uterus is not fully developed in our specimens, which must be rather immature. It consists of few branches somewhat rosette-shaped. The ova are thin-shelled, and measure 0·032 by 0·028 mm.

Dibothriocephalus scotti.

The second species of *Dibothriocephalus* found in the alimentary measured about 8cm. in length (fig. 3). One attained a length of 9cm., but the other three or four specimens were shorter. The number of proglottides is some 150. The head is rounded, not at all conical, but like the amber mouthpiece of a Turkish pipe (fig. 4). The slit-like grooves are dorsal and ventral. The head measures 1mm. across, and perhaps a little less from before backward. It is succeeded by a neck which, in some specimens, is a little narrower than the head; in others about as broad. The proglottides soon begin to be evident, but I do not think one can say there is no neck. In this respect this worm differs from *D. hians* of *Leptonyx monachus*, Wagn., *Phoca barbata*, Müll., and *P. annellata*, Nilss., which, in some respects, it resembles.

The proglottides are at first some five times as broad as they are long, but sooner or later—and it depends upon the state of contraction of the worm when killed, how soon or how late—the proglottides become square, with parallel sides, and they remain square until the end. The posterior border is slightly thickened, and stands out at right angles from the body. It practically does not, however, overlap the succeeding proglottis.

The reproductive organs consist of numerous testes lying scattered superficially through the proglottides; the ducts of these presumably unite, though they could not be seen, and open into an exceeding muscular penis, which in most cases is protruded from the proglottis. The penis is situated in the middle line close to the anterior edge of the proglottis. It bears no hooks. Close behind it opens the vagina, which makes a coiling course backwards to where the two short oviducts from the ovary meet it. The ovaries are two, somewhat pear-shaped; they lie each side, near the hinder end of the proglottis behind the uterus, and are of fair size. A minute shell gland is visible at the juncture of the oviducts. No tube entering the uterus is visible.

The uterus is roomy, it opens on the ventral surface in the middle line, and about half-way along the proglottis. The opening is circular. Just within this opening the uterus forms a spherical chamber, which contains a fair number of ova. From this chamber two or three lateral branches diverge, and these may be cut twice in one plane, but in no sense is the uterus rosette-shaped.

The ova measure on an average 0·04mm. by 0·03mm., but the shape varies; some

are rather more rounded than those of the other two species, and some have more pointed ends. The egg-shell is thick, with two clearly-defined contours.

The yolk-glands are easily recognised by their brown and glistening appearance. Like the testes they are scattered, but they lie more superficially than the latter. Although there is little differentiation between the medullary and the cortical regions, it is plain that the yolk-glands lie in the cortex and the testes in the medulla.

The epithelium of this Cestode consists of unusually large cells, somewhat columnar in shape, with their square outer ends pressed against the cuticle, and their inner ends tapering (fig. 7). Their nuclei lie about, but not quite at, the same level, near the inner end.

The parenchyma is loose and stains but slightly, it is traversed by but few muscle fibres. The single pair of longitudinal excretory canals are conspicuous in sections, and so are the nerve trunks. There are numerous small excretory tubules running just below the external epithelium.

I have ventured to dedicate this species to Captain Scott, the distinguished commander of the Antarctic Expedition, though I am well aware that there is a certain delicacy in doing so. Some people have a horror of Cestodes, and do not care to have their names associated with them.

Dibothriocephalus scotti.—Length of specimens 9cm. and under; number of proglottides about 140; head rounded, diameter 1mm.; average width of middle proglottides about 2mm.; very short neck. Posterior edges of proglottides stand out, but do not appreciably overlap the anterior end of succeeding proglottis; uterus spacious, with a few diverticula, not a rosette; ova 0·04 by 0·03mm., with thick shell.

DIBOTHRIOCEPHALUS WILSONI.

This is a very attractive little tapeworm of few proglottides, which I have ventured to dedicate to my friend Mr. E. A. Wilson, M.B., who was both a doctor and a zoologist in the 'Discovery.' It somewhat resembles Krabbe's *Dibothriocephalus lanceolatus*, from *Phoca barbata*, but is much smaller.

The length varies from 4 to 5·5mm. In the larger forms the greatest breadth is 1mm., this occurs in the region of the last segment but one, or perhaps two. The breadth of the head is a little less than 0·5mm., and its greatest length is about the same.

The number of the proglottides varies from nine to thirteen or fourteen. There is no neck, the first proglottis lying close to the head. The proglottides gradually widen until they reach a breadth of 1mm., and in this region are somewhat crumpled (fig. 8). The last proglottis is shaped like a truncated cone, rather indented at the hinder narrower end. The hinder edges of the proglottis only slightly overlap the anterior edge of the following proglottis; they are in all cases but the last wider than the

anterior border of the same proglottis, and thus each proglottis has, like the last, the outline of a truncated cone, but it is turned the other way up.

In the centre of each of the middle proglottides is a dark line caused by the opening of the penis, the oviduct, and the uterus. The penis is most anterior, and is very muscular, it is in many cases exserted. The base of the penis passes into a spherical vesicula seminalis. The testes are scattered through the central tissue.

The oviduct crosses the duct of the uterus, which is very short and practically hardly exists, and runs backward to the ovary and the shell-gland which lie behind the uterus.

The uterus is but slightly convoluted and contains few ova, they measure 0·042 by 0·035mm.; at any rate, that is about the average, for they vary a good deal in their dimensions. They have a single and not very thick egg-shell.

Like the cells in *D. scotti*, the epithelial units of *D. wilsoni* are remarkably well defined and show but little differentiation. The parenchyma again is, at any rate anteriorly, not the vacuolated, spongy-looking tissue which one sees in the older proglottides, but consists of plump cells, well defined, full of protoplasm, with nuclei near the edge.

Dibothriocephalus wilsoni.—A small form, length 4 to 5·5mm.; greatest breadth 1mm.; nine to thirteen proglottides, like truncated cones; the last is inverted; no neck; edges of central proglottides rather crumpled; posterior edges but slightly overlapping.

It is a remarkable fact that the only Cestoda brought back by the naturalists on the 'Discovery' were obtained from one (and that by no means a common one) animal, *Ommatophoca rossi*, or Ross's Seal, an animal, in Captain Barrett-Hamilton's words, so little known that it "might, until a year or two ago, have claimed, and claimed justly," along with Weddell's Seal, "to be considered amongst the rarest and most obscurely known of all mammals."* It is also remarkable that the Cestoda should all belong to the same genus.

If we want to have the history of the *Dibothriocephalid* species which we find in this animal, the smallest of the Antarctic seals, we must look to its food. Ross's Seal is remarkable for the feebleness and variability of its dentition. "It seems probable that the exact number of its teeth is not of importance to this animal."† Apparently it lives on soft food. Wilson mentions, in the work just quoted, that the "food of this species consists of octopus and vegetable stuffs or seaweeds," and again in "The Voyage of the 'Discovery,'" the "jelly-fish and squids, which apparently form their food." Strictly speaking, I do not think that any cestode larva has been found in a jelly-fish, though *Scolex polymorphus* is recorded from more than one genus of Ctenophore. On the whole it seems more likely that the plerocercoid stage will be found—if ever it be found—in the tissues of one of the Cephalopods.

* Report on the Collections of Natural History made in the Antarctic Regions during the voyage of the 'Southern Cross,' London, 1902, p. 2.

† Op. cit., p. 15.

EXPLANATION OF FIGURES.

FIG. 1.—Transverse section through the head of *D. antarcticus*, showing the edges of the suckers curling in round some foreign body, probably mucous tissue of the host.

„ 2.—Transverse section of *D. antarcticus* in the region of the neck, showing the regular arrangement of the longitudinal muscles ; *ac.*, excretory canals ; *n.c.*, nerve cord.

„ 3.—*Dibothriocephalus scotti*, × 2.

„ 4.—The head and sucker of *D. scotti*, × about 25, two views.

„ 5.—Surface view of *D. scotti*, × about 25, showing anteriorly the genital opening, *g.p.* ; the ova, *ov.*, scattered in the uterus, and the yolk-glands, *y.glds.*

„ 6.—Longitudinal section through two proglottides of *D. scotti*, showing median opening of uterus, *o.ut.*, penis, *p.*, and opening of vagina, *o.v.*

„ 7.—Section through epidermis and external parenchyma of *D. scotti.*

„ 8.—View of *D. wilsoni*, × 15.

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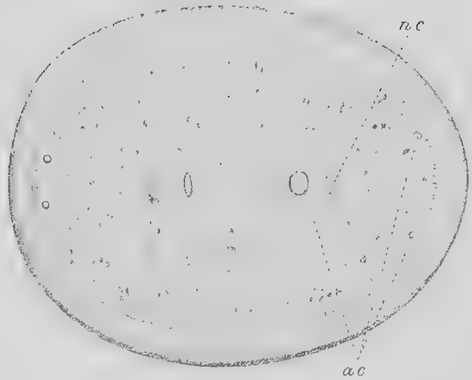

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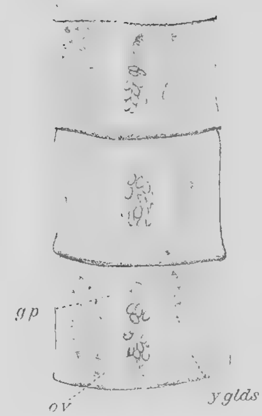

5.

Antarctic (Discovery) Exp.

E. Wilson, Cambridge.

1 & 2 Dibothriocephalus antarcticus.
3-7 D. scotti. 8. D. wilsoni.

CŒLENTERA.

I.—ALCYONARIA.

By Sydney J. Hickson, M.A., F.R.S.,

Professor of Zoology in the Victoria University of Manchester.

(2 Plates.)

The collection of Alcyonaria does not present many very remarkable features. The most interesting species is *Ceratoisis spicata*, which forms an important connecting link between the groups of species formerly separated into the two genera *Ceratoisis* and *Primnoisis*. It is quite unlike any species that has hitherto been discovered.

Primnoella divergens is an important new discovery, as it exhibits many characters of the genus *Caligorgia*, and may be regarded as a connecting link between the two genera.

Clavularia frankliniana and *Alcyonium paessleri* were found by the 'Southern Cross' expedition off Franklin Island. It is a remarkable fact that not a single specimen of either of these genera was obtained by the Scottish National Antarctic Expedition.

Thouarella antarctica, which was first obtained off the Falkland Islands, appears to be a common species in the Southern Seas.

The only species of Pennatulida found was *Umbellula carpenteri*, a species discovered by the 'Challenger' expedition and hitherto found only in the South Polar seas. Only one specimen was obtained, and this was unfortunately destroyed by fire in my laboratory.

The 'Scotia' expedition obtained twenty specimens of *Umbellula durissima*, but not one other specimen of the Pennatulida.

FAMILY CLAVULARIIDÆ.

Clavularia frankliniana.

(Plate II., figs. 20, 21.)

Clavularia frankliniana, Roule, Rep. 'Southern Cross' (1902), p. 290.

Localities 1.—W.Q., March 21, 1902, 30 yards from ship on Port Quarter. 8 fms.
,, 2.—W.Q., March 21, 1902. 10 fathoms.
,, 3.—W.Q., March 18, 1902. 10 fathoms.
,, 4.—W.Q., June 15, 1902. $12\frac{3}{4}$ fathoms.

There are many specimens of this species attached to stones, worm tubes and other foreign objects. I have little doubt they belong to the same species as those described

by Professor Roule from 10 fathoms off Franklin Island. At first it seemed possible that a new specific name should be introduced for these specimens, as they differ from the description of the type in size, in the character of the stolon, and in the absence of spicules in the tentacles; but on further examination of the specimens from locality 4, and some small specimens from other localities that I had previously overlooked, I came to the conclusion that the species is very variable and that these specimens cannot be satisfactorily distinguished from *C. frankliniana.*

The specimens are found attached to shells, stones, and worm tubes, and the colonies vary in size according to the nature of their support and the number and character of the other organisms associated with them. The specimen drawn on Plate II., fig. 20, was encrusting a black stone and was not interfered with in any way by other organisms, but another specimen from the same locality [4], growing on a worm tube, was associated with *Alcyonium paessleri*, Polyzoa, Sponges, and other organisms.

The stolon consists of a number of bands ramifying and anastomosing over the surface of the support, each about 2–3 mm. in width, but in many places these bands unite to form a continuous membranous stolon. I have already (2) pointed out that in *C. australiensis* both ribboned and membranous stolons occur, and it is quite clear that this character of the stolon is not one that can as a rule be safely used for specific distinctions. A study of a number of specimens suggests very forcibly that the membranous condition is produced by an amalgamation of bands when the circumstances of the support permit. The fact that the type specimen is described by Professor Roule as having "stolons membraniformes" is not sufficient evidence to separate his specimens from these as a distinct species.

The zooids vary immensely in size. It is true that I have not found any so large as the largest of Professor Roule's specimens, 25 mm. in length and 5 mm. in diameter, but I have measured specimens 20 mm. in length and 3·5 mm. in diameter. They are scattered at distances of 2–5 mm. on the stolon bands, but are crowded together on the membranous parts. The body wall of the zooids is opaque, but may have been far more transparent in the living specimens. It is marked externally by eight well-defined longitudinal grooves. The tentacles are short and only partially retracted as in the type specimen. The spicules of the stolon and the basal portion of the zooids are long spindles with numerous short tubercles. A remarkable feature of many of these spicules is that one end is often truncated (Pl. II., fig. 21; and see also Professor Roule's figures (9), Pl. XLVII., 3a and 3c). They vary in size up to a maximum of about 0·35 mm. in length. The tentacles of some specimens I examined appeared to be devoid of spicules, and I cannot determine whether this is due to maceration in the preservative or to natural conditions. Other specimens, however, exhibit two rows of short spicules (0·15 mm. in length) on the outer side of the rachis of the tentacles.

Alcyonium paessleri.

(Plate II., figs. 22, 23.)

Alcyonium paessleri, May, Hamb. Magel. Samm., Alcyon. (1899), p. 6.

Localities :—1. Off Mt. Erebus, February 8, 1902. 100 fathoms.
2. W.Q., June 5, 1902. D. net hole. 56 fathoms.
3. W.Q., June 15, 1902. D. net hole. $12\frac{3}{4}$ fathoms.
4. W.Q., April 1, 1903. No. 6 hole. 124 fathoms.
5. W.Q., February 13, 1904. D. net, Hut Point.

In addition to the specimens from the localities mentioned above several small specimens were found in other bottles. It is evidently a common and widely distributed species ranging from shallow water to depths of over 100 fathoms.

The largest specimen was from locality 5 (Plate II., fig. 22). The colony is 50 mm. in height and 30 mm. in greatest breadth. It rises from a base of attachment of irregular form with a maximum width of 15 mm. There are 13 blunt lobes, of which the largest is 15 mm. × 7 mm. The anthocodiæ of this specimen were nearly all completely retracted.

The spicules of the anthocodiæ (of a specimen from loc. 3) are long spindles 0·35 mm. in length (Plate II., fig. 23b), and the spicules of the cœnenchym of the same specimen, clubs or short spindles ·08–0·1 mm. in length (fig. 23a), as well as a number of longer spindles of variable size attaining to the same length as those of the anthocodiæ. The two specimens from locality 3 are attached to a black stone, the specimens from localities 1 and 5 had their bases bent round the very slender stem of a dead *Ceratoisis* (*Primnoisis*). The colour of all the specimens is orange or pale orange, except the specimen from locality 4, which is white. The smaller specimens are not branched. The specimen from locality 4 consists of a single lobe 10 mm. in height by 6 mm. in diameter.

I have compared the specimens with a specimen obtained by the 'Southern Cross' Expedition in 24 fathoms off Franklin Island (3). They cannot, I think, be separated from the specimens of the species described by Dr. May (8) from Smyth Sound.

The species of the genus *Alcyonium* that have been described from Antarctic regions are *A. sollasi*, from the Straits of Magellan ('Challenger'), *A. haddoni*, Messier Channel ('Challenger') and *A. antarcticum*, off Heard Island ('Challenger'), and from Kerguelen (Studer). It is difficult to give any very precise characters to differentiate these three species from *Alcyonium paessleri*, but it is probable that *A. antarcticum* and *A. sollasi* are larger species, the largest specimen of *A. paessleri* being considerably smaller than the type specimens of the other two species. *Alcyonium haddoni* may be of the same size as *A. paessleri*, but some of the long spindles are ·7 mm. in length, about twice the size of any that I found in the specimens at my disposal, and the species is also

characterised by the presence of a certain number of four-rayed spicules of a type which does not occur in *A. paessleri.* On the whole then I am inclined to believe that *A. paessleri* is distinct from the other subantarctic species.

FAMILY ISIDÆ.

In the 'Challenger' report on the Alcyonaria, Professors Wright and Studer (14) proposed a division of this family into three sub-families, Ceratoisidinæ, Mopseinæ and Isidinæ, based upon the shape of the spicules. The study of many specimens belonging to the family has convinced me that this sub-division is unnecessary and inconvenient. The many variations of spicule characters that are found in the species of a single genus render these structures unsatisfactory for the purpose of wide systematic differentiation. If we take a single species from each of two of the sub-families and compare them, the differences observed in the character and arrangement of the spicules may seem to be of a higher rank than the usual differences between genera; while, on the other hand, the examination of a large number of species of the same two genera will reveal so many intermediate conditions as to render the separation of the genera, on spicule characters alone, impossible. This kind of difficulty is particularly well seen in the case of the genera *Ceratoisis* and *Primnoisis*, which were placed by Professors Wright and Studer in the sub-families Ceratoisidinæ and Mopseinæ respectively. In both these genera the branches arise from the calcareous internodes, a character which distinguishes them from the genera *Acanella*, *Lepidisis* and *Isis* belonging to the same family. The spicules in both genera are flattened and scale-like, but in the species attributed to *Ceratoisis* they are fusiform, whereas in those attributed to *Primnoisis* they are irregular flattened scales. In *Ceratoisis*, moreover, some of the spicules project as thorny processes from the calyx, whereas in *Primnoisis* they do not project.

In the description of the Alcyonaria from the Cape of Good Hope (4) I described a new species under the name *Ceratoisis ramosa*, which has many characters resembling some of the species of the genus *Primnoisis*, but the species appeared to me to differ so markedly from *Primnoisis* in having the spicules on the tentacles arranged longitudinally instead of transversely that I concluded it must belong to the genus *Ceratoisis*. On re-examination of the specimens I have confirmed this observation, but may add to it the fact that many of these tentacular spicules project slightly from the surface. The examination of the Antarctic specimens brings additional evidence to show the inconvenience of separating the two genera. The specimen of *Ceratoisis antarctica* was found in the same locality as that of *Ceratoisis spicata*; the former undoubtedly belongs to the group of species hitherto called by the generic name *Primnoisis*, as none of the spicules project from the surface of the calyx; the latter, however, has very long spicules, many of which project as thorny spines. The projecting spicules of the calyx of *Ceratoisis spicata*, moreover, resemble those of *C. grandiflora* in having the base bifid (Cf. Plate II., fig. 18a, with Prof. Studer's (10) figure Taf. v., fig. 34b), but whereas those of *C. grandiflora* seem to be nearly smooth on the surface, those

of *C. spicata* are covered with little wart-like projections. The spicules of the cœnenchym of *C. spicata* are irregular branched plates very much like the scales of my *Ceratoisis ramosa* and the *Primnoisis* group as figured by Professors Wright and Studer (14), and as they appear in the two species from the Antarctic collection.

The spicules of *Ceratoisis spicata* are indeed characteristic of the old genus *Ceratoisis* in so far as they project as spines from the calyx, but also characteristic of the genus *Primnoisis* in so far as their minute structure is concerned. It might be suggested that *Ceratoisis spicata* ought to be made a type of a new genus intermediate between the other two, but the general character of the axis is so similar to that of the two genera that this course is not to be justified. I have examined carefully the axis of all the species in the collection and of my species from the Cape, and cannot find any characters to distinguish them. The internodes in all cases are hollow, marked externally by shallow longitudinal grooves, but not by spines or tubercles as in *Acanthoisis.* The branches arise from the calcareous internodes, and the first node of each branch is always some distance from the origin of the branch.

There is never any difficulty in distinguishing the axes of *Ceratoisis* and *Primnoisis* from those of any other genus of the family, but I can find no characters to distinguish the axis of a *Ceratoisis* from that of a *Primnoisis.* When dead specimens with no calices or cœnenchym are examined, it is possible to identify them as belonging *either* to the genus *Primnoisis* or *Ceratoisis,* but it is quite impossible to determine to which of these genera they belong. It is quite possible, for example, that the form recently described as *Primnoisis ramosa* by Messrs. Thomson and Ritchie (11) may really be more closely allied to species hitherto included in the genus *Ceratoisis.* I would therefore venture to propose that in future the two genera, *Ceratoisis* and *Primnoisis,* be merged into one, and that the genus *Ceratoisis* thus enlarged be defined simply as: "Isidæ, with long, calcareous, hollow internodes, scored with shallow longitudinal grooves, short horny nodes, branches arising from the calcareous internodes."

The name *Primnoisis* should, in my opinion, disappear from our system, but for convenience sake I have retained the name in brackets in those species here described which, under the older system, would unquestionably have been placed in the genus *Primnoisis.*

Ceratoisis (Primnoisis) delicatula.

(Plate II., figs. 11 and 12.)

Locality :—W.Q., September 8th, 1903. No. 12 hole, 100 yds. S. of Hut Point. 25–30 fathoms.

The specimens on which this species is founded are in the form of a tangled mass of delicate branches attached to sponges and worm tubes. There appear to be no main stems, nor can I find any bases of attachment in the substance of the sponges. Whether a thick stem was left behind by the dredge or not I cannot say, but the tenuity and delicacy of the branches are sufficient to justify the specific name I have given to the species. The diameter of the thickest stems I have measured is 0·65 mm.

at the nodes and 0·6 mm. at the internodes. The ramification is irregular and in all directions, but the branches in all cases arise at an acute angle from the calcareous internodes. The cœnenchym is very thin, and is absent from a great many of the branches. The terminal branches are about 0·3 mm. in diameter at the base, and attenuate distally to a very fine point.

The internodes are 6 mm. long. Here and there shorter internodes occur, but on the whole the length of the internodes is fairly constant. The calices are quite irregularly scattered. Usually a group of four or five calices situated at intervals of 1 or 2 mm. stands apart from other groups, but as a great many calices have dropped off, this grouping may be the result of injury.

The calices are bent at an acute angle to the axis; the outside measurement is about 0·65 mm. The diameter of the calyx at the base is 0·3 mm., and at the crown 0·4 mm. The spicules of the cœnenchym are flat, tuberculated spindles, varying from 0·2 mm. to 0·1 mm. in length (fig. 12a). On the neck of the calyx similar spicules, somewhat bent, are arranged in fourteen or fifteen horizontal rows. The spicules of the crown and of the backs of the tentacles are often expanded at one end to form a triangle (fig. 12b).

Ceratoisis (Primnoisis) antarctica.

(Plate II., figs. 13, 14, 15.)

Isis antarctica, Studer, MB. Ak. Berlin 1878, p. 662.

Locality:—(1) McMurdo Bay, February 8, 1902, 96–120 fathoms; (2) McMurdo Bay, February 28, 1902, 20 fathoms.

The two specimens which may be attributed to this species are broken from their base, and each measures about 50 mm. in height. It is probable that they were torn from the same colony. The branching is quite irregular and shrubby. The internodes are about 6 mm. in length, but vary a good deal more than in *C. delicatula.* The thickest internode in the specimen is about 0·9 mm. in diameter. The calices are numerous, and situated at intervals of about 2 or 3 mm. on the branches, but gathered close together in clusters near the extremities. I cannot recognise any spiral arrangement of the calices such as that described for the type by Professors Wright and Studer (14). Each full-grown calyx is from 1 to 1·5 mm. in height and stands out almost at right angles to the axis.

The spicules of the cœnenchym are flat spindles about 0·3 mm. in length (fig. 14a), and those at the base of the calices are bent. The calices are protected by overlapping scales of very irregular form and size, but usually straight on one side, convex on the other, and not exceeding 0·3 mm. in length (fig. 14b). The scales on the back of the tentacles are all horizontally placed (fig. 15).

The type of this species was obtained by the 'Gazelle' in 60 fathoms off Kerguelen (Studer (10), p. 661), and subsequently specimens were obtained by the 'Challenger' in 310 fathoms off Prince Edward Island. I have compared the

specimens in the collection with those obtained by the 'Challenger,' and consider they belong to the same species, although there are some points of difference between them. As in *C. delicatula*, there is no main stem in these specimens, the colony arising from a tangled mass of branches in a sponge. The main stem may have been lost, or a colony starting in a sponge may not need, and therefore not form, the stout supporting main stem; but in either case its absence in these specimens does not necessarily demand the constitution of a new specific group.

In addition to the specimens referred to above, there are specimens from two other localities, which probably belong to this species. The localities given on the labels are: (1) off Erebus and Terror, 500 fathoms, January 22, 1902; (2) E. end of Barrier, 100 fathoms, January 29, 1902. In neither case is any statement made as to the nature of the preservative used, but as in the first case the spicules are absent, and in the latter small and apparently corroded, I cannot but suspect that they were treated with picric acid before being transferred to spirit in the same manner as some of the specimens of *Thouarella antarctica* (p. 9) were preserved. The specimens resemble *C. antarctica* in the arrangement of the branches, in the size of the calices, and in the size of the internodes; but they both differ from the other specimens of *C. antarctica* in the collection in having a well-defined main stem. The axis of this stem consists of nodes about 6 mm. in length, with a diameter of from 1 to 1·5 mm. In the specimen from locality 2 the main stem is 160 mm. long, and the basal part, which is nearly devoid of cœnenchym, supports colonies of *Cephalodiscus hodgsoni*.

Ceratoisis spicata.

(Plate II., figs. 16, 17, 18.)

Locality:—McMurdo Bay, February 8, 1902. 96 to 120 fathoms.

The base is missing from the specimen, which is about 75 mm. in height. A main axis may be traced through the whole height, from which secondary branches arise quite irregularly on all sides. Notwithstanding this, however, by the bending of the secondary branches the colony becomes almost flabellate. The internodes both of the main axis and the branches are 12 to 20 mm. in length. At the base the diameter of the internodes is 1 mm. The terminal internodes are not very delicate, being about 0·5 mm. in diameter where they join the last internode, but they come to a sharp point distally. The cœnenchym is thin. The calices are irregularly scattered, cylindrical in shape, about 2 mm. in height when full grown, and situated at distances of 1 to 2 mm. apart on the lower part of the branches, but clustered at their distal extremities.

The calices are covered with an armature of overlapping scales, some of which are tri-radiate, others irregular in form (figs. 18b, c). Surrounding the crown there are two or three circlets of spicules, of which one ray projects as a very prominent spine (fig. 18a). The largest of these tri-radiate spicules are over 0·7 mm. in length, the spine being as much as 0·45 mm., and the other two rays 0·35 mm. in length. The other irregular spicules of the calices and the spicules that cover the cœnenchym are of

such varying forms that it is difficult to describe them in a few words. Some have four or five spokes united together at a central hub, some are irregular spindles, others are forked. The forms of irregular spicules given by Kölliker (7 A) of *Paramuricea* in his Taf. xvii., 19 and 20, of *Mopsea* in his Taf. xix., fig. 41, are not unlike some of the spicules seen in my preparations.

The position of this remarkable species is difficult to determine at present. In the character of its axis it is closely related to *Primnoisis*, but the spicules are altogether unlike any species of that genus that has hitherto been described. The irregular spicules of the cœnenchym are like the spicules I described in *Ceratoisis ramosa* from the Cape; the spicules of the calyx have a remote resemblance to the forked spicules of the calyx of *Ceratoisis grandiflora* described by Professor Studer, but are spined and warted instead of being smooth.

In the species attributed to the genus *Ceratoisis* described by Professors Wright and Studer (14), the internodes vary in length from 15–60 mm.; in those attributed to the genus *Primnoisis* they vary from 2·5–15 mm. (in one species only). The length of the internodes of *C. spicata* varying from 13–20 mm. in length brings it, in this respect, nearer to the *Ceratoisis* group than to the *Primnoisis* group, but in *Ceratoisis ramosa* of the Cape the internodes are only 3–5 mm. in length. It is clear, therefore, that notwithstanding the many resemblances to the *Primnoisis* group the species is really more closely related to the *Ceratoisis* group. In any case it forms a connecting link between the two groups which renders it very difficult to regard them any longer as distinct genera.

In considering this question of the amalgamation of the two genera a glance at the distribution of the species will be of interest.

CERATOISIS GROUP.

C. grayi (Wright), N. Atlantic, 400 fms.
C. ornata (Verrill), Nova Scotia, 250 fms.
C. palmæ (W. & S.), Canary Islands, 1125 fms.
C. philippinensis (W. & S.), Philippines, 82 fms.
C. nuda (W. & S.), Fiji, reefs.
C. paucispinosa (W. & S.), Japan, 345 fms.
C. grandiflora (Studer), Fiji, 975 fms.
C. siemensii (Studer), Newfoundland, 1780 fms.
C. ramosa (Hickson), Cape, 230 fms.
C. spicata (Hickson), McMurdo Bay, 120 fms.

PRIMNOISIS GROUP.

P. antarctica (Studer), Kerguelen, 60 fms.
P. antarctica (W. & S.), Prince Edward Island, 310 fms.
P. antarctica (Hickson), McMurdo Bay, 20–120 fms.
P. sparsa (W. & S.), Prince Edward Island, 86 fms.
P. rigida (W. & S.), Rio de la Plata, 600 fms.
P. capensis (Studer), C. of Good Hope, 50 fms.
P. ambigua (W. & S.), Kerguelen, 10–80 fms.
P. ambigua (Hiles), Lifu, 10 fms.
P. ramosa (Thomson & Ritchie), 74° S., 22° W., 161 fms.
P. delicatula (Hickson), W.Q., 25–30 fms.

From this table it will be seen that all the species of the Ceratoisis group, except *C. nuda* and *C. grandiflora* from Fiji and *C. ramosa* from the Cape, are found north of the Equator, whereas all the species of the Primnoisis group are found in the Antarctic seas or south of the Equator. *Ceratoisis ramosa* is in many respects an intermediate form, and is perhaps more closely related to the Primnoisis than the Ceratoisis group; and *Ceratoisis spicata* is also an intermediate form with closer affinities to the Ceratoisis group.

FAMILY PRIMNOIDÆ.

This family is represented by two genera, *Thouarella* and *Primnoella*, both belonging to the sub-family Primnoidinæ.

THOUARELLA ANTARCTICA (12).

Primnoa antarctica, Milne-Edwards, Hist. nat. Corall., i. (1857), p. 140 [Valenciennes Atlas, Voy. Venus (1846), Zooph., pl. 2, fig. 2].
Thouarella antarctica, Wright and Studer, Chall. Rep. Alcyon. (1889), p. 65 *ibique citata*.

(Plate II., figs. 19, 24.)

Localities :—1. W.Q., February 28, 1903. No. 6 Hole. 130 fathoms.
2. Off Coulman Island, January 13, 1902. Dredge. 100 fathoms.
3. McMurdo Bay, February 8, 1902. 96–120 fathoms.
4. Station 270, March 4, 1904. (Just within Antarctic Circle.) 254 fathoms.

The specimens all belong apparently to one species. Only one specimen with the base broken off was obtained in the first locality (February 28, 1903), and this I have no hesitation in placing in Valenciennes' species. The specimens from off Coulman Island, locality 2, were treated with picric acid before preservation in alcohol, and this has changed the character of the spicules and thereby the size of the calices to such an extent that the determination of their species is rendered uncertain. The specimen from McMurdo Bay is only a fragment, but it is well preserved, and the calices are identical in general characters with those of the specimen from locality 1.

All the specimens have the characteristic bottle-brush ("goupillon") mode of branching. Several of them have the main axis quite simple, the twigs, as in the type specimens, being much more slender than the axis, but the specimen from locality 1 shows two dichotomous branchings at the base of the axis where the colony is dead and bare, and one specimen from Coulman Island has the axis bifurcated so that two "goupillons" spring from the same axis.

The heights of the specimens from Coulman Island are 450 mm. (the specimen with bifurcated main axis), 175 mm. (a small specimen, but the only one with base of attachment), 200 mm. and 150 mm. The height of the specimen from the

Winter Quarters locality is 220 mm. The diameter of the colony is in all specimens about 30 mm.

The calices are about 1·5 mm. in height. They are clustered together at the ends, but scattered at considerable intervals near the base of the branches. There are a few calices on the main axis itself. The spicules are overlapping scales, oval or heart-shaped on the general cœnenchym and on the base of the calices. Diameters of these scales, taken at right angles, are about 0·43 mm. × 0·4 mm. The scales forming the operculum of the calyx have a thick, keeled spine, the sharp, saw-like keel being on the oval side of the scale and extending from the tip of the spine to the centre of the plate (fig. 19). The length of the spine is about 0·4 mm., and the distance from the tip of the spine to the opposite border of the plate 0·64 mm. The breadth of the plate is 0·43 mm.

The type of this species was found by Captain Thouars off the Falkland Islands. The species was also obtained by the 'Challenger' near the Crozets in 550 fathoms. A good account of the genus and of the species belonging to it is given by Dr. Versluys (13). The species was only figured by Valenciennes (12), but was subsequently described by Professors Wright and Studer (14) from specimens obtained by the 'Challenger.'

I have compared the specimens with an example of *Thouarella brucii*, kindly lent to me by Prof. J. A. Thomson, and I am able to confirm the distinction of the species. The scales are larger in *T. antarctica*, and the spines of the coronal scales longer and sharper than in *T. brucei.*

Primnoella divergens.

E. end of Barrier, January 29, 1902. 100 fathoms.

(Plate I., figs. 8, 9 & 10.)

The single specimen of this extremely interesting species is 135 mm. in height, but the base of attachment is lost, and the thickest part of the horny axis is 2 mm. in diameter. In the first notes I made I placed it in the genus *Primnoella*, but on reconsideration and further study I transferred it to the genus *Caligorgia*, and gave it the name *C. squamata.* Taking advantage of a visit to my laboratory by Dr. Versluys of Amsterdam, whose great work on the Primnoidæ of the Siboga expedition (13) has just appeared, I asked him to examine the specimen, with the result that it is returned to the genus *Primnoella* with the name *P. divergens.* This hesitancy in determining the generic position of the specimen was due to the fact that it occupies a position in the system almost exactly intermediate between these two genera. It is either a very divergent *Primnoella*, or else a very divergent *Caligorgia.* It is perhaps a matter of opinion whether it is most nearly related to the former or to the latter genus. Dr. Versluys pointed out certain characters which I had overlooked, and converted me to the view that it should be placed in the genus *Primnoella*; but it exhibits so many characters of *Caligorgia*, which I shall relate

in due course, that there was a great deal of excuse for my original mistake. I wish to express my thanks to Dr. Versluys for his very valuable advice and assistance in defining the position of this species.

The genus *Primnoella* is usually defined as simple or unbranched, but as Versluys (13) has shown that *Narella divaricata* of Studer must be transferred to the genus *Primnoella*, and this species is "spärlich verzweigt" (Studer 10, p. 643), the branching habit of our new species is not quite exceptional.

The branching is irregular and approximately in one plane, so that a large colony would probably be flabelliform. Some of the branches appear to divide dichotomously, but in general the smaller secondary branches arise alternately from the large main branches. The colony as a whole has some general resemblance in its mode of branching to a species of *Caligorgia*, figured by Gray (1, p. 37) under the name *Callicella elegans*, and to *Caligorgia tuberculata*, as figured by Versluys (13, pl. vi., fig. 15). About one-third of the colony is devoid of cœnenchym and calices.

The number of calices in a whorl varies. On the largest branches there are eight or nine; on the terminal branches from six to four. On the thicker branches the whorls are in places scattered, and there are some calices isolated. On the terminal branches the whorls are about 1 mm. apart.

The calices are 1 mm. in height, and many of them show a swelling on the axial side, due to the presence of a gonad. They are protected by three or four rows of five or six scales, which often overlap when the calyx is dried, but in spirit specimens, and frequently when dried, appear to be separated by considerable intervals of skin, as shown in fig. 8. The opercular scales are very small, and the next circle of scales, called by Versluys the "Randschuppen," or marginal scales of the calyx, are not much larger, but do not overlap the opercular scales. The opercular scales are usually provided with a short spine, fig. 9, but the marginal scales are rarely, and the other scales of the calyx never pointed in this way. The opercular scales are about $0 \cdot 3 \times 0 \cdot 1$ mm., and the other scales about $0 \cdot 5 \times 0 \cdot 3$ mm. in size; but they vary a great deal in size, according to their position.

As in other species of *Primnoella* the cœnenchym is protected by an armature of overlapping scales, but these are exceptional in being irregular in arrangement, and they are not provided with a dentate margin (fig. 10). These scales are usually nearly square in shape, with rounded edges, and may reach a size of 0·5 mm. across diagonally. The surface of each scale is ornamented by a series of small tubercles as in *Primnoella*. Underneath the scales there are rows of small spicules or "sclerites" about 0·1 mm. in length, very similar to those drawn by Versluys for *Primnoella australasiæ* (13, fig. 60, p. 53).

The axis is horny, but contains a considerable amount of calcium carbonate.

The species is related to *Primnoella* in the following characters. The scales are thin and covered with small tubercles, but not sculptured nor marked by prominent lines extending from the nucleus to the margin. The scales of the cœnenchym overlap.

The presence of sclerites beneath the scales of the cœnenchym, but in this respect it also resembles *Caligorgia ventilabrum.* On the other hand, it is related to *Caligorgia* in being branched. *Caligorgia modesta* is only slightly branched, as is also *Primnoella divaricata,* but the great majority of the species of *Caligorgia* are profusely ramified, whereas the species of *Primnoella* are, with the one exception mentioned above, unbranched. It resembles *Caligorgia* also in having isolated calices on the thicker branches, in the character that the marginal scales do not overlap the opercular scales as they do in *Primnoella,* and also in the presence of a distinct but small spine on the opercular and marginal scales. In general characters the scales of the cœnenchym resemble those of the species of *Primnoella,* but they do not show the row of teeth on the lower border, which has suggested to some authors a resemblance to ctenoid scales of fishes.

The geographical distribution of the two genera might be regarded as supporting the view that our new species is more closely related to *Primnoella* than *Caligorgia.* Species of *Primnoella* have been found only in the southern seas at depths ranging from comparatively shallow water to 600 fathoms. *Primnoella scotiæ* of Messrs. Thomson and Ritchie was found as far south as 54° 25′. The latitude of *Primnoella divergens* is approximately 76° S. *Caligorgia,* on the other hand, occurs in the Mediterranean and North Atlantic, in the Pacific Ocean and Malay Archipelago, and as far south as New Zealand, but has not been found off Kerguelen, the Magellan Straits, or in the Antarctic Ocean.

PENNATULACEA.

FAMILY UMBELLULIDÆ.

Umbellula carpenteri.

(Plate I., figs. 1–7.)

Umbellula carpenteri, Kölliker, Rep. Chall. Pennatul. (1880), p. 23.

One specimen of this species was obtained off the Barrier on January 27th, 1902, at approximately 174° E. long. and 178° S. lat., at a depth of 300 fathoms. Mud bottom.

The total length of the specimen is about 700 mm. The stalk is for the greater part of its length exceedingly slender, 1 to 1·5 mm. in diameter. It begins to dilate to form the bulb about 135 mm. from the peduncular extremity, and at about 40 mm. from this extremity the bulb reaches its maximum size, 7 mm. in diameter (fig. 1b).

The autozooids are nine in number. Of these, eight are arranged in the form of a rosette, the ninth (a) being situated on the distal side (*i.e.*, the side turned away from the peduncle) of the rosette (fig. 3). This ninth autozooid is probably the primary zooid (hauptzooid) of the colony. Each of the eight autozooids forming the rosette is 30 mm. in length, the diameter of the rosette being a little over 60 mm. as measured from the extremity of one autozooid to the extremity of another immediately opposite to it. These measurements do not include the tentacles, which are about 15 mm. in length. The ninth autozooid is rather shorter than the others.

The tentacles of the autozooids have some twelve or thirteen pinnæ on each side (fig. 7). These pinnæ are not always situated opposite to one another nor regularly alternate. The pinnæ of one side seem to be developed independently of those on the opposite side. The size of the pinnæ varies in a manner that suggests that new pinnæ are interpolated between the old ones ; but they rarely exceed a total length of 4 mm.

There are numerous siphonozooids. The most conspicuous of these are arranged in petaloid areas on the under, *i.e.*, proximal side of the rosette (fig. 2). The apex of seven of these petaloid area ends at the fork between two autozooids, but the apex of one area (fig. 2, V,) extends between the two autozooids to reach the distal side, where it terminates at the base of the ninth autozooid. This area is, according to Dr. Jungersen (p. 82), the ventral area. At the apex of the dorsal petaloid area, *i.e.*, the one immediately opposite to this, there is a single siphonozooid distinguished by its greater size (fig. 2, D.).

The siphonozooids of these areas are about 0·3 mm. in diameter and project slightly as small conical warts or papillæ above the cœnenchym. There can be no doubt that they are to a certain extent contracted, as the mouth area is very constricted. From the apex of the cone of many there projects a single long (0·6 mm.) simple digitiform tentacle (fig. 4). I have little doubt that each siphonozooid has such a tentacle, but it is broken off or completely retracted in many.

In addition to these, there are many other siphonozooids distributed on the stalk and bulb. They are very inconspicuous when the surface of the spirit specimen is examined, but they can be recognised as minute slit-like depressions, arranged in longitudinal rows, when a simple magnifying glass is used. I cut tangential sections through a small piece of the upper part of the bulb and found that these siphonozooids have a diameter of about 0·14 mm. (fig. 6.) The stomodaeum is long, penetrating right through the thick cortex of the bulb, is oval in section, the longer diameter being about 0·1 mm., and it has a well marked siphonoglyph (*Si*). The specimen is not sufficiently well preserved to enable me to state definitely that the dorsal mesenteric filaments are present, but certain groups of darkly stained cells situated below the stomodaeum probably represent these structures. These siphonozooids do not possess a tentacle.

It was at this point in my investigation that a fire broke out in my laboratory and entirely destroyed the specimen. I am, therefore, unable to give any further description of the distribution of these siphonozooids. There is no doubt that they occur all along the thin part of the stalk and on the upper end of the bulb. I believe they occur also on the lower part of the bulb, but I made no sections to confirm the external features. It is not possible to make any definite statement concerning the presence or absence of calcareous spicules in the bulb. There are no calcareous bodies in the upper part of the bulb, nor are there any in the autozooids or siphonozooids of the rosette. In the one small piece of the dermis of the lower part of the bulb I could find none, but it is just possible that a further search might have revealed them.

There can be no doubt that this specimen belongs to the same species as those described by Kölliker (7) under the name *Umbellula carpenteri.* These specimens were five in number, and found by the 'Challenger' at depths of 1975 fathoms and 1950 fathoms in the south polar seas; the stage of growth of the 'Discovery' specimen being probably an older one than specimen E of the 'Challenger' series.

But although we may be satisfied to give the specimen Kölliker's name, the careful description by Dr. Jungersen (6) of a series of specimens of the north polar and deep Atlantic species, *U. encrinus,* has impressed me with the belief that in time these two species (*U. encrinus* and *U. carpenteri*) will be merged into one. There is no doubt that they are closely related, but as accident has prevented me from further testing this opinion I must leave the problem for others to consider. The striking similarities in structure between these north and south polar forms of *Umbellula* is, however, a matter of theoretical interest.

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DESCRIPTION OF THE PLATES.

PLATE I.

FIG. 1.—*Umbellula carpenteri* (reduced to $\frac{1}{4}$ size). *Au,* Crown of Autozooids; *b.*, Peduncular bulb.

„ 2.—*U. carpenteri.* Proximal view of crown of autozooids. Natural size. *Si.*, Petaloid area of siphonozooids; *D.*, Dorsal petaloid area terminating in a large siphonozooid; *V.*, Ventral petaloid area; *G.*, An autozooid that was injured, the tentacles missing.

„ 3.—*U. carpenteri.* Distal view of the crown of autozooids. *a,* the ninth or "Haupt" zooid.

„ 4.—*U. carpenteri.* Four siphonozooids of the petaloid areas. *tent.*, the single long tentacle of each siphonozooid, × 40 diams.

„ 5.—*U. carpenteri.* Transverse section of one of the siphonozooids of a petaloid area, × 120. *Si.*, Siphonoglyph; *d. m.*, Dorsal mesenteries.

„ 6.—*U. carpenteri.* Transverse section of a small siphonozooid of the peduncular bulb, × 120.

„ 7.—*U. carpenteri.* One of the tentacles of an autozooid, to show the arrangement of the pinnæ, × $2\frac{1}{2}$.

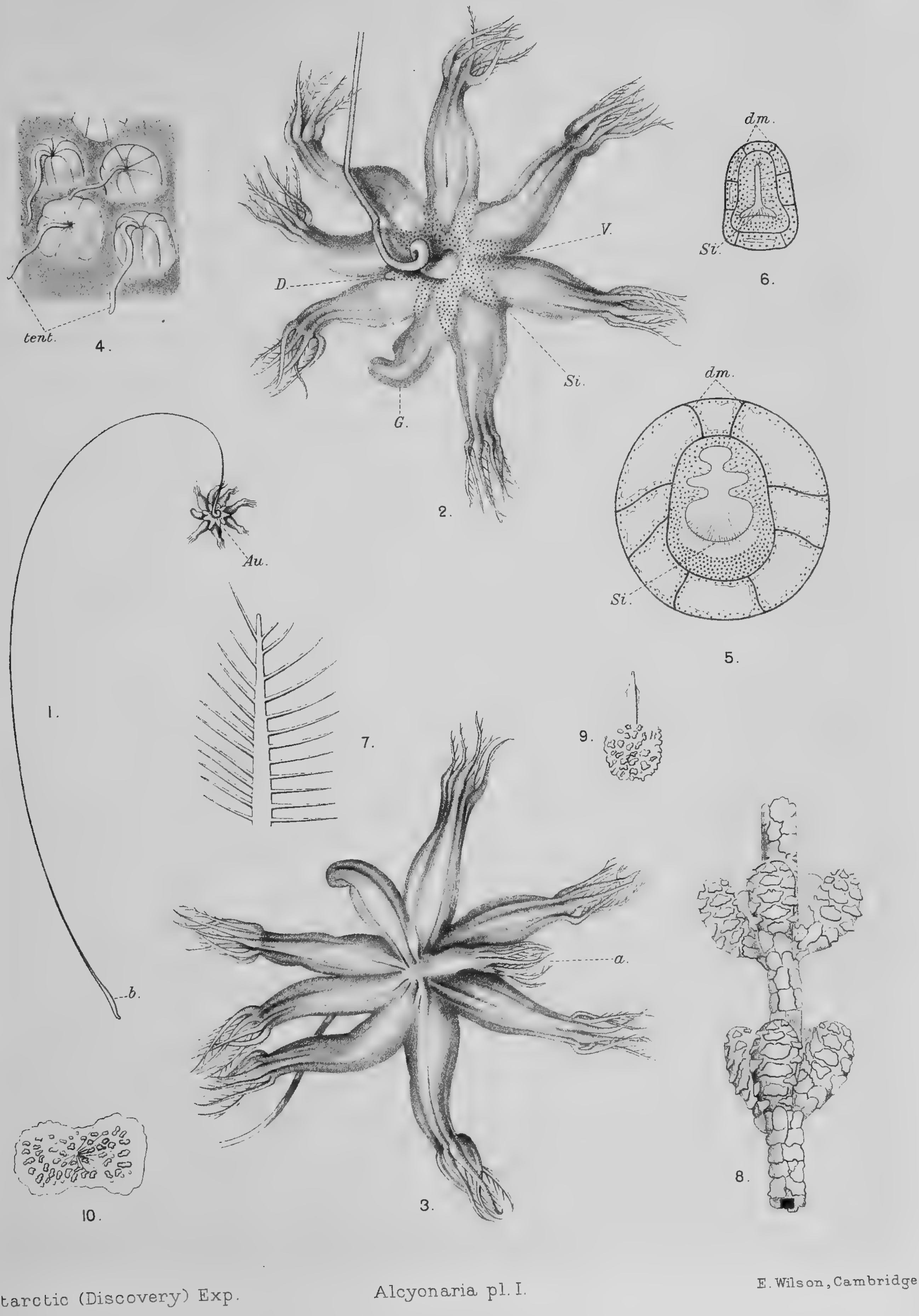
„ 8.—*Primnoella divergens.* Two whorls as seen in a spirit specimen, showing the manner in which the scales project on the surface, × 10.

„ 9.—*Primnoella divergens.* A spicule of the calyx, × 50.

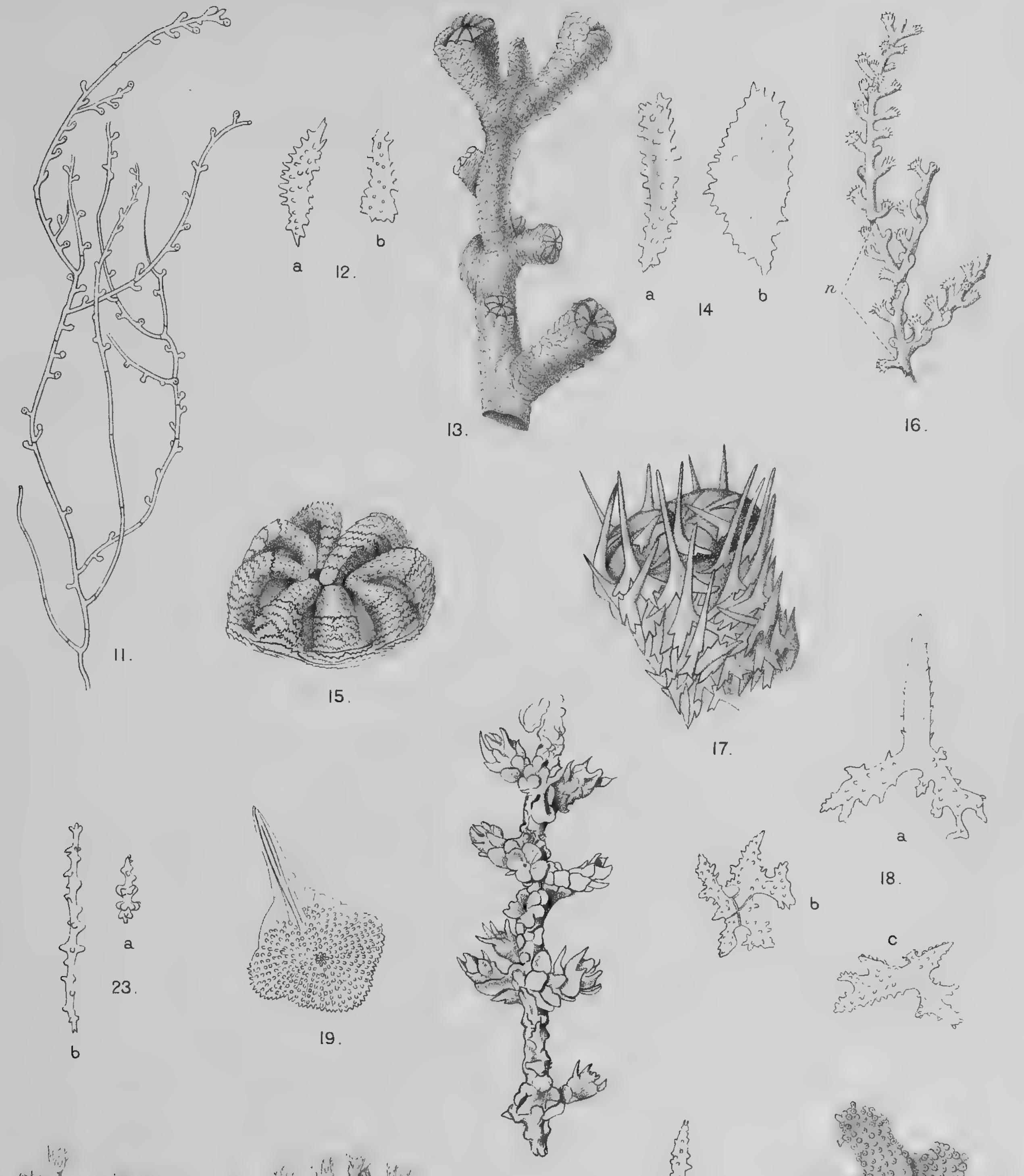
„ 10.—*Primnoella divergens.* A spicule of the cœnenchym, × 50.

PLATE II.

FIG. 11.—*Ceratoisis delicatula.* A few branches of a colony, × 2.
„ 12 —*Ceratoisis delicatula.* *a*, Spindle-shaped spicule ; *b*, triangular plate, × 100.
„ 13.—*Ceratoisis antarctica.* A terminal branch, × 12.
„ 14.—*Ceratoisis antarctica.* *a*, Spindle-shaped spicule ; *b*, plate, × 100.
„ 15.—*Ceratoisis antarctica.* View of corona and folded tentacles, to show the arrangement of the spicules, × ca. 50.
„ 16.—*Ceratoisis spicata.* A branch, × 2. At *n*. the horny nodes may be seen.
„ 17.—*Ceratoisis spicata.* Side view of a calyx, × ca. 30.
„ 18.—*Ceratoisis spicata.* Spicules. *a*, Forked spicule of a calyx ; *b* and *c*, irregular spicules of the cœnenchym and calyx base, × 50.
„ 19.—*Thouarella antarctica.* A spicule of the corona, × 60. (See also Fig. 24.)
„ 20.—*Clavularia frankliniana.* Nat. size.
„ 21.—*Clavularia frankliniana.* Spicule of body wall, × 75.
„ 22.—*Alcyonium paessleri.* Nat. size.
„ 23.—*Alcyonium paessleri.* *a*, Short club spicule of the cœnenchym, × 150 ; *b*, long spindle-shaped spicule of the body wall of an anthocodia, × 100.
„ 24.—*Thouarella antarctica.* A small piece of a branch of a dried specimen, drawn from a photograph, × ca. 20.



Antarctic (Discovery) Exp. Alcyonaria pl. I. E. Wilson, Cambridge.



Antarctic (Discovery) Exp. Alcyonaria pl. II. E. Wilson, Cambridge

II.—HYDROID ZOOPHYTES.

By Sydney J. Hickson, M.A., F.R.S., *Professor of Zoology in the Victoria University of Manchester*; and

F. H. Gravely, B.Sc., *Research Scholar in the Victoria University of Manchester.*

(4 plates.)

The collection of Hydroid zoophytes made by the 'Discovery' Expedition proved to be remarkably rich and interesting. At the first inspection there seemed to be but few species, and these (with the exception of a few solitary forms of *Lampra*) were large, ramified and gorgonia-like in consistency; but a careful examination of these large colonies soon revealed other species of epizoic habits which rapidly increased in numbers as our investigations proceeded. In the end the number of distinct species was twenty-five, or about twice as many as we expected to find.

The large colonies of *Halecium arboreum* support *Perigonimus antarcticus, Stylactis halecii, Campanularia everta, C. laevis, Campanulina*, and *Halecium tenellum.*

Perigonimus antarcticus supports *Campanulina A.*, *Eudendrium insigne*, and *Lafoëina longitheca. Eudendrium insigne* was also found on a specimen of the Alcyonarian genus *Ceratoisis. Sertularella plectilis* and *Campanulina B.* are attached to a colony of *Campanularia verticillata.*

Of the twenty-five species only two—*Obelia geniculata* from the Auckland Islands, and *Dictyocladium fuscum* from Coulman Island—were found outside the limits of McMurdo Bay and the edge of the great ice barrier. In other words, twenty-three of the twenty-five species represent the hydroid zoophyte fauna of the most southerly limit of our knowledge of marine zoology. Two species—*Lampra microrhiza* and *Plumularia glacialis*—were found only at the east end of the barrier.

It seems probable that the part of McMurdo Bay from which these specimens came is covered with a continuous sheet of ice for the greater part of each year and in some years has no open water. There is good reason for believing that the great ice barrier is afloat, and consequently the few specimens obtained by the Expedition at the east end of the barrier may represent samples of a fauna that extends for some distance under the barrier towards the South Pole.

We may regard this collection of Hydroid zoophytes as the representatives of a sub-glacial fauna, and subject to the condition that larvæ or free swimming

gonophores, if they occurred, could never or very rarely reach the surface of the sea. It is, therefore, noteworthy in this connexion that, although there are eight families represented, not a single species exhibits free swimming medusiform gonophores. The only species in the whole collection with free swimming medusæ is *Obelia geniculata* from the Auckland Islands.

The question whether a particular specimen of zoophyte is or is not the type of a new species must be, to a certain extent, a matter of opinion, or perhaps of prejudice, of the systematic zoologist who describes the collection. The actual number of new species in this collection therefore is not a matter of great statistical importance. We regard, however, ten of the twenty-three sub-glacial species as certainly new to science, and five species as probably new. Four species have only been found elsewhere in Southern seas, one on the coast of California, and three are European. Of the three European species only one — *Halecium tenellum* — has hitherto been found in Southern seas.

The noteworthy features of the collection as a whole are: the large proportion of new species, the absence of any definite new generic type, and the occurrence of three species (excluding *Obelia geniculata,* which is well known to occur in Southern seas) that are common species on the British coast.

The most remarkable and interesting species is undoubtedly *Hydractinia dendritica,* a new species, which we have decided to study in greater detail. The question of the extent of degeneration of the gonophores of the sub-glacial species as compared with that of similar species living in open seas, is one that appears to us likely to furnish some interesting results if carefully pursued.

In conclusion we wish to express our sense of admiration and appreciation of the services rendered to science by Mr. Hodgson, the biologist of the Expedition, in collecting these Hydrozoa. The work of boring holes in the ice and of patiently dredging under the severe conditions of an Antarctic winter must have been of a nature that demanded extraordinary skill and enthusiasm in the cause of zoology.

The following is a complete list of the species we have described. They all come from McMurdo Bay, except those with specially named localities.

There is not sufficient material to make any definite statement as to bathymetric range, but it is noteworthy that several species were found in depths ranging from shallow water down to 130 fathoms.

GYMNOBLASTEA.

FAM. BOUGAINVILLIIDAE.

Perigonimus antarcticus, sp. n. 10-130 fathoms.
Eudendrium insigne, Hincks. 10–20 fathoms.
Stylactis halecii, sp. n. 20 fathoms.

FAM. PODOCORYNIDAE.

Hydractinia dendritica, sp. n. 5–10 fathoms.

FAM. TUBULARIIDAE.

Tubularia ralphii, Bale. 10–20 fathoms.
Tubularia hodgsoni, sp. n. 130 fathoms.
Tubularia longstaffii, sp. n. 124 fathoms.

FAM. CORYNIDAE.

Two undetermined species. 0–20 and 100 fathoms.

FAM. CORYMORPHIDAE.

Lampra parvula, sp. n. 10–20 fathoms.
Lampra microrhiza, sp. n. E. end of Barrier. 300 fathoms.

FAM. MYRIOTHELIDAE.

Myriothela (?).

CALYPTOBLASTEA.

FAM. SERTULARIIDAE.

Sertularella spiralis, sp. n. 130 fathoms.
Sertularella plectilis, sp. n. 0–130 fathoms.
Dictyocladium fuscum, sp. n. Coulman Island. 8–15 fathoms.

FAM. PLUMULARIIDAE.

Plumularia glacialis, sp. n. E. end of Barrier. 100 fathoms.

FAM. CAMPANULARIIDAE.

Sub-Fam. Campanulariinae.

Campanularia verticillata, Linnæus. New variety. 10–20 fathoms.
Campanularia everta, Clark. 0–20 fathoms.
Campanularia laevis, Hartlaub. 0–20 fathoms.

Sub-Fam. Haleciinae.

Halecium arboreum, Allman. E. end of Barrier and McMurdo Bay. 0–130 fathoms.
Halecium tenellum, Hincks. 10–20 fathoms.

Sub-Fam. Lafoëinae.

Lafoëina longitheca, Jäderholm. 0–20 fathoms.

FAM. EUCOPIDAE.

Obelia geniculata, Linnæus. Auckland Islands.
Campanulina (A). 0–20 fathoms.
Campanulina (B). 0–20 fathoms.

The Classification Adopted.

One of the greatest difficulties that the systematic zoologist has to meet in writing an account of a collection of Hydrozoa is the determination of the system of classification that he will adopt. There are so many different opinions as to the relative systematic value of the characters presented by the hydrosome and gonosome respectively, and our knowledge of the extent of the modification of these characters by environmental conditions is so imperfect that every system of classification that

has been proposed must present to those who are working upon new materials or on new lines of research many inconsistencies and inconveniences.

The best classification is, after all, the one that is most convenient for the particular class of investigation that the author is engaged upon, and consequently those who approach the Hydrozoa from one side will be inclined to adopt a classification which to authors who approach it from another seems erroneous or unsatisfactory.

It is clearly not to the advantage of Science that the classification of a group of animals should constantly change, and it is better to adopt one which may in some respects seem unsatisfactory than to propose alterations upon any grounds other than those of wide and far-reaching new investigation.

Allman and Hincks, the two great pioneers of the zoology of Hydrozoa, distributed the genera amongst a large number of families; in fact, according to their system a great many genera stand alone, or almost alone, in a family.

The tendency of recent systematists has been to rearrange the genera in such a manner as to reduce the number of families, and this tendency appears to us to be not only more convenient but to be founded on a sound scientific basis.

The system we have used is that adopted by one of us in his essay on the Coelenterata in the Cambridge Natural History, Vol. I.; a system which, like any other, is open to many criticisms in detail, but has been found on the whole to suit our purpose as well as any other.

FAMILY BOUGAINVILLIIDAE.

This family includes, according to our system, the sub-families *Bougainvilliinae* (*Bougainvilliidae*, Gegenbaur), *Margelinae* (*Margelidae*, Hæckel), *Dicorynae* (*Dicorynidae*, Allman), *Eudendriinae* (*Eudendriidae*, Hincks), and the *Bimeriinae* (*Bimeriidae*, Allman).

The hydranths in this family have a single circle of filiform tentacles, and the base of the hydranths is protected by a tube of perisarc.

The inclusion of *Stylactis* in the sub-family *Bimeriinae* is perhaps the most unsatisfactory feature in this arrangement, but as we have found in some cases a short collar-like tube of perisarc at the base of the hydranths (fig. 33, c. p.), which has not been observed, so far, in any species of the family—the *Podocorynidae*—to which in other respects *Stylactis* has many affinities, we have retained it in this family.

SUB-FAMILY BOUGAINVILLIINAE.

PERIGONIMUS ANTARCTICUS.

(Plate I., figs. 1, 2, 3; and Plate IV., fig. 32.)

Perigonimus sp., Hartlaub, Voy. du Belgica, Hydroiden, (1904).

Locality.—Common in McMurdo Bay at depths of 0–130 fms.

The species was found in no less than eleven of the bottles sent to us, and is usually

attached to the stems of *Halecium arboreum.* The character of the bottom on which its support grows is described as stony, gravelly, or very rough ground (Flagon Pt.).

The species differs from most of the species of *Perigonimus* in having fixed gonophores.

On this account it might be placed by some authorities in Allman's genus *Wrightia,* but for reasons that have recently been urged by Motz-Kossowska (**17** : pp. 68–71) we are of opinion that *Wrightia* should be merged with *Perigonimus.* In this particular case the reasons for disregarding the genus *Wrightia* seem to be particularly strong. The size of the colonies and of the individual zooids being much greater than in the only known species of *Wrightia,* the specimens would, in the absence of the gonophores, be undoubtedly referred to the genus *Perigonimus.* If *Perigonimus* shares the power or possibility that some other genera of gymnoblastic hydroids undoubtedly possess of variation in the character of the liberation of the gonophores, being in some cases phanerocodonic and in others adelocodonic, we should at least expect that the adelocodonic variation or condition would occur in specimens living in an arm of the sea such as McMurdo Bay, that is for so many months in the year covered with ice.

Hydrosome.—From the ramifying hydrorhiza attached to the *Halecium* several unbranched or occasionally slightly branched hydrocauli arise (fig. 1). They attain to a height of about 8 mm. Many of the hydrocauli appear to be simply unattached branches of the hydrorhiza, and even the pedicels of the gonophores occasionally give off branches of indefinite function and power of growth.

The transition from hydrocaulus to hydranth is gradual, the length of each hydranth being about 1 mm. The hypostome is conical and is surrounded at its base by a circlet of about 10 filiform tentacles each about 0·6 mm. in length. The perisarc is continued as an exceedingly thin film over the hydranth as far as the base of the tentacles. The hydranths vary considerably in shape (fig. 3) and are probably very contractile.

Gonosome.—The gonophores are situated on short pedicels which, in the case of the female, are thickened distally. The colonies appear to be invariably dioecious. In both sexes the gonophore is a degenerate medusa. In both sexes the gonophore is protected by a thin layer of perisarc. It is larger in the female than in the male (1·1 mm. × 0·9 mm. in the female, and 0·9 mm. × 0·7 mm. in the male).

In the female gonophore there is a large sub-umbrella cavity (fig. 3, *su.c.*), the manubrium is well developed and has a well-marked endoderm cavity.

In the young gonophore there is a distinct endodermal layer of cells and mesogloea in the umbrella, but in the adult gonophore (fig. 32) these are reduced to a non-cellular mesogloea except at the margin, where a cord of cells represents the ring canal. There are no radial canals in the adult gonophore.

In the male gonophore the sub-umbrella cavity is completely filled with sperm cells (figs. 2 and 32, sp.).

It is possible that this species of *Perigonimus* is identical with the one obtained by the 'Belgica' in 71° 15′ S. and 87° 39′ W. (**8**: pp. 8–9; Pl. I., fig. 2); but Dr. Hartlaub had not the good fortune to be able to examine and report upon the gonophores.

The hydrosome has also some resemblance to that of the British species *P. coccineus* (Wright, see Hincks, **11**: pp. 97–98) of which the gonophores are not known.

Of the better known British species it has some affinities with *P. serpens* (Allman, **2**: pp. 327–328; Pl. XI., figs. 7–9), but differs from it in the more slender hydrocauli and the more distinct difference between hydrocaulus and hydranth and in the adelocodonic gonophores.

Sars (**21**: pp. 28–32; Pl. II., figs. 37–43) has described a species from 20–30 fathoms off Manger, Norway, which he named *Rhizoragium roseum.* This species appears to us to be so closely related to *Perigonimus antarcticus* that it might with some propriety be placed in the same species. The reason for separating *Rhizoragium roseum* from the genus *Perigonimus* was undoubtedly the adelocodonic medusoid character of the gonophores, but in the character of the hydrosome it is undoubtedly a *Perigonimus.*

Sars describes the "medusa-buds" as uncommonly large (up to 1 mm. in diam.) in proportion to the hydranths, the claviform naked part of which is only 0·3 – 0·5 mm. in diameter. They are not attached to the naked part, but are situated on the creeping hydrorhiza as in *P. muscoides.* The degeneration of the gonophores consists in a reduction of the umbrella-wall and the loss of the radial canals and umbrella-mouth. In the oldest gonophores, however, the margin of the umbrella was thickened, and judging from the figure, it bore rudimentary tentacular processes.

P. antarcticus resembles *Rhizoragium roseum* in many of these characters and also in the shapes and general characters of the hydranths and the number of their tentacles, but differs from it in the slightly branching habit of the hydrocauli and in having some of the gonophores arising near the proximal ends of the hydrocauli instead of only from the hydrorhiza. The gonophores of *P. antarcticus* are protected by a chitinous perisarc, but this is very thin, and may have been overlooked by Sars in his species. We have not found in our species any processes on the gonophores corresponding with the tentacular processes figured by Sars. However, in *Rhizoragium* the tentacular processes only occur in gonophores old enough to contain planulae larvae. In our species, on the other hand, the more mature gonophores exhibit a less well developed marginal thickening and in other respects the umbrella-wall is more degenerate than in the younger stages, and it therefore seems to us improbable that the tentacular processes would be present in stages old enough to contain larvae.

Our conclusion is, therefore, that it is more convenient to regard *Rhizoragium roseum*—which should in our opinion be called *Perigonimus roseus*—and *Perigonimus antarcticus* as distinct species.

SUB-FAMILY EUDENDRIINAE.

Eudendrium insigne.

(Plate I., fig. 4.)

Eudendrium insigne, Hincks, British Hydroid Zoophytes (1868), pp. 86–87.

Localities.—McMurdo Bay, February 20th and 28th, 1902; March 21st, 1903; 10–20 fathoms.

This delicate little hydroid, consisting of small irregularly branched colonies, was found attached to other Coelenterata, such as *Ceratoisis* and *Campanularia*. It did not occur in great abundance, but a few colonies were found in several bottles of specimens obtained in McMurdo Bay.

Hydrosome.—The hydrorhiza consists of a plexus of branching roots loosely attached to its support. At frequent intervals it gives off hydrocauli, which are themselves branched. These stems are very slender, strictly monosiphonic, seldom upright, but growing in a straggling tangle like the stems of a climbing plant searching for a new support. The hydrorhiza and the free hydrocauli are invested by a thin straw-coloured perisarc, which is slightly annulated at the base of and at intervals on the hydrocauli.

There is considerable difficulty in distinguishing between hydrorhiza and the stem, and many of the stems that are now free may possibly have been at one time attached to the support. This difficulty renders the estimation of the height of the colony a matter of conjecture, but it is about 25 mm.

The perisarc frequently ends very abruptly at the base of the hydranths, but in some cases it seems to attenuate gradually.

The hydranths are 0·5 mm. in height and have the usual characters of the genus. There are about twenty filiform tentacles 0·5 mm. in length, arranged in a single verticel at the base of a trumpet-shaped hypostome (fig. 4).

At the base of the hydranth there is a circular groove bounded proximally by a collar of very conspicuous deeply-staining cells (fig. 4, *c.*). Occasionally both collar and groove are apparently absent.

Hincks does not give a clear figure of this groove or collar in the British specimens, but states (p. 87) that "there is a circular groove near the base of the body, from which the gonophores spring—a portion of the structure which I misinterpreted at first, and which led me to suppose that there was a shallow cup round the base of the polypite." From this quotation it would appear that in Hincks' specimens, as in the Antarctic forms, the lower margin of the groove was sometimes slightly swollen out to form a collar. In general form and size the Antarctic specimens resemble the European specimens, but they differ from them in the respect that the perisarc is less "closely ringed throughout."

Although *Eudendrium insigne* appears to be widely distributed in the seas of the Northern hemisphere, it is not included in Hartlaub's list (**10**: pp. 505–509) of Southern species.

SUB-FAMILY BIMERIINAE.

Genus stylactis.

The generic name *Stylactis* was introduced by Allman for two species referred to the genus *Podocoryne* by Sars (*P. fucicola*, and a variety of *P. carnea*). The principal characters that distinguish the genus from Podocoryne are—(1) The absence of any superficial coenosarc covering the hydrorhizal plexus; and (2) the gonophores in the form of sporosacs instead of free swimming medusæ. From *Hydractinia* the genus is distinguished by the first of these characters, but it agrees with it in the second character.

Allman placed the genus in his family Bimeriidae, and thus removed it from the neighbourhood of the other two genera.

The opinion of later writers appears to favour the view that *Stylactis* is more closely related to *Hydractinia* and *Podocoryne* than Allman's classification suggests.

Bonnevie (**5**: p. 485) unites *Hydractinia* and *Podocoryne* into one genus, *Hydractinia*, and Motz-Kossowska (**17**: pp. 81–85) includes in the same genus the two species that formed the genus *Stylactis* of Allman, and has added a new species *H. pruvoti* from the Balearic Islands, which is intermediate in characters between the species attributed by older authors to the genera *Stylactis* and *Podocoryne* respectively.

We are quite convinced of the general affinities of the three genera, which are indeed emphasised by this collection from the Antarctic Sea in so far as we have a species of *Stylactis* with dactylozooids of a simple kind, and a species of *Hydractinia* without dactylozooids, the usual condition being that *Stylactis* has dactylozooids and *Hydractinia* has not. At the same time, the hydrorhiza of our two forms is so distinct and the minute characters of the gonophores so different that we have thought it better to retain the generic name *Stylactis* and keep it in the family Bougainvilliidae for the present.

Stylactis halecii.

(Plate I., figs. 5, 6; and Plate IV., fig. 33).

Locality:—McMurdo Bay; February 28th, 1902. Found at depths of less than 20 fathoms.

A considerable quantity of this interesting species was found encrusting the thicker stems of *Halecium arboreum*. It arrived in a fairly good state of preservation notwithstanding that the bottle containing it was broken in transit.

Hydrosome.—The hydranths arise directly from an encrusting hydrorhiza

consisting of a dense mass of branching and anastomosing tubes (fig. 6). Each tube is covered with its own very thin sheath of perisarc (fig. 33) and there is no common sheath of coenosarc covering the hydrorhiza as a whole, such as we find in the Podocorynidae. In the central parts of the hydrorhiza the tubes are closely packed, anastomose freely, and are disposed in several layers. At the periphery however the tubes are reduced to a single layer, become more dispersed, and anastomose slightly (fig. 3). There are three kinds of zooids.

In the central part of the colony there are gastrozooids and blastostyles (gonozooids) (fig. 6); at the periphery, gastrozooids and dactylozooids (fig. 5). The gastrozooids (figs. 5 and 6, *gz.*) are 1-2 mm. in height. They exhibit a conical hypostome surrounded by a circlet of six to ten simple tentacles each about 0·5 mm. in length.

The dactylozooids (fig. 5, *d.*) are short finger-like structures 0·25 mm. long by 0·06 in diameter, terminating in a pad distally which bears a battery of nematocysts. The dactylozooids appear to be covered with a chitinous perisarc, but in sections it is seen to be extremely thin or absent at the distal extremity. We have some specimens with the nematocysts discharged, and there can be little doubt therefore that the battery is functional. These dactylozooids have no tentacles. The blastostyles are shorter than the gastrozooids, and usually exhibit neither mouth nor tentacles (fig. 6, *bl.*). There is always a short conical hypostome armed with nematocysts, and occasionally this is surrounded by a circle of four rudimentary tentacles (fig. 6, *bl. t.*).

The body of the blastostyle is usually considerably dilated and has a superficial resemblance to a simple ovoid sporosac.

Gonosome.—The medusoid structure of the gonosome is completely reduced in the male, but as no female blastostyles were found we can make no statement to the effect that the same is true of both sexes. The sperm cells (fig. 33, *sp.*) are found in a dense cluster between the ectoderm and endoderm even in the youngest blastostyles we have examined (0·1 mm. in length), and neither in these nor in the older blastostyles can we find any true medusoid structures.

FAMILY PODOCORYNIDAE.

In this family we include *Podocoryne* (Sars), *Hydractinia* (Allman), and other less well-known allied genera. The very interesting new genus *Hydrodendrium* (Nutting) may, we consider, be now included in this family, as the species *Hydractinia dendritica* connects it with the other species of *Hydractinia.*

Hydractinia dendritica.

(Plate II., figs. 7, 8, 9, 9a, 10.)

Localities.—Specimen A: W.Q., March 21st, 1902; –10 fms. Specimen B: Locality unrecorded. Label lost.

It is necessary in the description of this very remarkable hydroid to refer constantly to the special characters of the two specimens we received. We shall therefore call them specimen A and specimen B respectively.

Specimen A consists of a single continuous colony encrusting the stems of a specimen of *Halecium arboreum.* From this encrusting mass, which possesses all the general features of an ordinary *Hydractinia,* a single upright branching stem arises, which has some resemblance to the stems of *Hydrodendrium gorgonoides* (Nutting **20**: pp. 936–938; Pl. I., figs. 1–6; Pl. VII., figs. 1–2).

Specimen B consists of a large number of brittle and broken stems bearing Hydractinian hydranths, but without any encrusting base or hydrorhiza. It seems probable that all these broken stems belong to one colony, and we are convinced that specimen B belongs to the same species as specimen A.

Specimen A.—There are two regions in this specimen, the encrusting or basal region, and the upright branching stem, the rhizocaulus. The basal part (fig. 9, *enc. r.*, fig. 9a) entirely surrounds the polysiphonic stems of *Halecium arboreum,* only a few pinnules of the supporting hydroid penetrating it and being exposed. It is about 0·4 mm. thick, the outer part to a depth of about 0·2 mm. from the surface containing coenosarc, the lower part consisting of a lacunar skeleton with strands of tissue in some of the lacunæ, whilst others may be empty. The "spines" of other species of *Hydractinia* and of *Podocoryne* are represented in this species by a series of low ridges (fig. 7, *r. sp.*), often continuous with each other, but projecting irregularly on the surface of the colony. They have some resemblance to the hydrophores of *Ceratella* (Spencer **21**), but seem to have no definite relation to the zooids. There are only two kinds of zooids, the gastrozooids and the blastostyles (gonozooids).

The gastrozooids (fig. 7, *gz.*) vary a good deal in length. The usual length is about 2 mm., but they are in some cases as much as 4 mm. in length. There is a conical hypostome surrounded by a single circlet of from 9 to 13 tentacles, each about 0·6 mm. in length. It is evident that the gastrozooids are extremely contractile, and it is noteworthy that in some cases they have been killed introverted, the circlet of tentacles having assumed a position at the base.

The blastostyles (fig. 7, *bl.*) are from 0·3–0·7 mm. in height. They are small and degenerate. They usually exhibit a few small tentacles 0·05 mm. in length, but in some cases no tentacles at all could be seen. They may have a minute mouth, but usually have not. The gonophores (fig. 7, *gph.*) are all probably female and in the form of sporosacs. They occur in a single circlet round the base of the blastostyle.

The upright branching stem of this specimen rises to a height of about 40 mm., and is about 0·8 mm. in diameter at the base (fig. 9, *fr. rhc.*). The ramification is irregular, the eight or nine terminal branches ending in some cases in a long filamentous process. The surface of these branches is remarkably smooth. The

gastrozooids and blastostyles at the base of the stem are very similar to those of the basal encrusting part of the colony, but distally the gastrozooids are smaller and apparently less contractile, and blastostyles are absent.

Specimen B.—Assuming that the pieces in the bottle containing this specimen all belong to one colony, we have estimated that the height of the colony must have been at least 150 mm. There is no encrusting basal support as in specimen A, and the axes of the branches do not show any foreign hydroid or other kind of core. The branches arise irregularly and anastomose freely (fig. 10). They are circular in section, remarkably smooth on the surface, and their maximum diameter is about 3 mm. They are therefore much longer and thicker than the upright branching stem of specimen A, and we may add presumably older. Although there is no true basal part similar to that of specimen A, the encrusting habit is seen in places where sponge spicules and other foreign bodies have been overgrown by the colony.

The skeleton is composed of a series of parallel intercommunicating chitinous tubes, the superficial tubes being externally incomplete, but there are no definite ridges or spines on the surface as in the basal part of specimen A.

On the larger branches there appear to be no zooids at all. At the distal ends there are numerous small immature zooids which may become either gastrozooids or blastostyles, as well as a considerable number of gastrozooids. These gastrozooids (fig. 8, *gz.*) are about 1·5 mm. in height, and therefore slightly smaller than the majority of the gastrozooids of the basal part of specimen A. The mouth is on a conical hypostome which is surrounded by a series of filiform tentacles, 6–10 in number, and each one about 0·6 mm. in length. Proximally to the region where the immature zooids and gastrozooids occur there is a region with numerous ripe blastostyles (fig. 8, *bl.*), and only a few gastrozooids. These blastostyles vary from 0·3 to 0·7 mm. in height, but the majority are larger than those of A. They have 4–8 tentacles 0·1–0·2 mm. in length, and have in some cases a minute mouth. The blastostyles each bear from 1–5 sporosacs (fig. 7, *gph.*) which in our specimens were all male, and when ripe about 0·3 mm. in diameter. The sporosacs are borne *just above* the base of the blastostyle. The branch shown in fig. 7 is somewhat intermediate in character between the region of gastrozooids alone and the typical region of blastostyles.

In comparing the two specimens we notice certain differences between the basal part of specimen A and specimen B which might be regarded by some authors to be of sufficient importance to necessitate their separation into distinct species. Thus, the surface of B is smooth, of the basal part of A ridged; the gastrozooids are smaller in B than in A; the blastostyles of B are on an average larger than in A, and have a larger number of longer tentacles; the sporosacs of B are larger and less numerous than those of A, and are situated *above* the base, and not at the base, as in A. Moreover in B the skeleton has the form of a series of parallel but communicating tubes, whereas in A it has the same irregular lacunar arrangement that is found in *H. echinata* and other species.

The fortunate preservation of a small and probably young branching stem of specimen A, with gastrozooids at its proximal end similar to those of the basal parts and at its distal end similar to those of specimen B; with a smooth surface similar to that of specimen B, and ramifying and growing without any axial support as specimen B does, may be regarded as conclusive evidence that the specimens belong to the same species.

The species resembles *Hydractinia* in having sessile hydranths, a thick membranous hydrorhiza covered with a continuous sheath of ectoderm and provided with a lacunar chitinous skeleton, and in having adelocodonic gonophores.

On the other hand, it differs from many of the species of *Hydractinia* in forming large unsupported rhizocauline branching stems, and in the absence of dactylozooids.

A species that has close affinities with *H. dendritica* is *H. angusta*, from 71° S. and 87° W. 400 metres (Hartlaub **9**: pp. 7–8; Pl. IV., figs. 1–6). It forms branching (?) cylindrical rhizocauline stems. It has also tentaculate blastostyles and no dactylozooids. But it has thorny processes on the surface, which in our species are confined to the basal part; the gastrozooids of our species are quite twice as large and the tentacles are more numerous than in *Hydractinia angusta.*

It differs from *Hydrodendrium gorgonoides* (Nutting **20**: pp. 936–938; Pl. I., figs. 1–6; Pl. VII., figs. 1–2) from Hawaii, in having definite blastostyles, in the presence of a large hypostome on the gastrozooid, in the colonies being unisexual, and in other characters. It resembles *Hydrodendrium* in the occurrence of branching brittle rhizocauline stems, in the absence of spines on the surface, and in the absence of dactylozooids.

Hydractinia angusta and *Hydractinia dendritica* form two interesting links in a chain connecting the ordinary species of *Hydractinia* with *Hydrodendrium.* It may be noted here that in addition to the species of *Hydractinia* mentioned above that have no dactylozooids, *Hydractinia parvispina* (Hartlaub), *H. carnea*, var. *inermis*, *H. humilis*, and *H. provuti* (Koss.) are said to have no dactylozooids; and in other species described by Bonnevie (**6**), Hincks (**11**), and Allman (**2**) no mention is made of these peculiar zooids. The presence of dactylozooids cannot therefore be regarded as a character of the genus.

FAMILY TUBULARIIDAE.

GENUS TUBULARIA (Linn. emend. Allman).

We have found in the collection what appear to be three distinct species of *Tubularia*, but of these, one is represented by a single hydranth, and one by two hydranths. The third species agrees fairly well with the description given in Bale's Australian Zoophytes of a species described in MS. by Halley from Hobson's Bay.

TUBULARIA RALPHI.

(Plate II., fig. 12.)

Tubularia ralphii, W. M. Bale, Cat. Austr. Hydroid Zoophytes Austr. Mus. (1884), p. 42.

Localities.—W.Q., February 28th, 1902; –20 fms. Hut Point, October 18th and November 13th, 1902. Flagon Point, January 17th, 1902; 10–20 fms.

This species is represented in the collection by a group of dead perisarcal tubes and a single hydranth which is not well preserved, as well as by a few immature specimens.

Hydrosome.—The height of the colony is from 60–120 mm. In the W.Q. specimen, five long and slender hydrocauli arise from a contorted hydrorhizal plexus. Each hydrocaulus is unbranched, and considerably narrower at the base than at the distal extremity, where its diameter is about 0·8 mm. The perisarc covering the hydrocaulus is smooth and conspicuous, but becomes very thin and transparent at the base of the hydranth. The hydranth is flask-shaped, and has a dense tuft of distal tentacles and a circlet of about twenty or more proximal tentacles each about 5 mm. in length.

Gonosome.—The blastostyles arise immediately above the proximal row of tentacles. Owing to the condition of the specimen, their number could not be accurately determined.

The ripe gonophores (females only were observed) are somewhat pear-shaped, and provided distally with four rudimentary tentacles. The walls of the umbrella are very thin, but the sub-umbrella cavity is large, and usually contains more than one, but not more than three actinulæ. No trace of tentacles could be observed on these larvæ.

The blastostyles are very short, and the gonophores are borne upon them in dense clusters, so that it is probable that in life they were not pendulous. The blastostyles are about 2 mm. in length, and each ripe female gonophore about 1 mm. in length. The male gonophores of another specimen were not mature.

The only printed description (**4**: p. 42) of the type of this species which was found in shallow water in Hobson's Bay, Victoria, is so short that it is impossible to be certain that our identification of these Antarctic Tubularias is correct, but, except in the fact that our specimens are rather larger than the type in several measurements, there is no good reason for separating them from it.

TUBULARIA HODGSONI.

(Plate II., fig. 13, and Plate IV., fig. 34.)

Locality.—W.Q., January 1st, 1902; No. 6 hole; 130 fms. No. 11 hole, April 25th, 1903.

Unfortunately, only two zooids of this remarkably interesting species were found.

Hydrosome.—The hydrocaulus springs from a hydrorhiza composed of thin branches ramifying in a sponge. The hydrocaulus is unbranched, and rises to a height of about 40 mm. It is of almost uniform diameter throughout.

The perisarc is thin, membranous, and ends rather abruptly a little below the hydranth, which is marked off from the hydrocaulus by a slight constriction. The height of the cylindrical hydranth is about 5 mm. There is a dense tuft of about 60 tentacles round the mouth. The proximal circlet is composed of about 25 tentacles, 7 mm. in length.

Gonosome.—There are about nine bunches of closely packed spherical gonophores attached in the usual manner to the inner or distal side of the proximal circlet of tentacles. From the position they occupy in the spirit specimen lying close alongside the wall of the hydranth, it seems probable that in life the hydranth was pendulous. The blastostyles are about 5 mm. in length and the gonophores are 0·9 mm. in diameter. The structure of the gonophores is extremely interesting. The umbrella wall consists (fig. 34) of an outer layer of simple ectoderm, a thin layer of mesogloea, and an inner layer of ectoderm cells, which appear to be tri-radiate in section, one of the radii projecting into the mass of sperm cells, and the other two radii forming a continuous thin membrane lining the sub-umbrella cavity. At the distal extremity of the gonophore the inner and outer ectoderm layers are continuous, and between them the umbrella wall is thickened and contains a ring of endoderm cells. In some cases there are four short tentacular thickenings of the ectoderm at the mouth of the gonophore (fig. 34). In the centre of the gonophore there is a well-marked manubrium or spadix, with a lumen and without any clearly-defined ectoderm covering. The sperm cells entirely fill the space between this endodermal spadix and the umbrella wall. The sperm cells lying in contact with the manubrium are evidently in the earlier stages of spermagenesis, those lying at the periphery of the sub-umbrella cavity in the later stages of spermagenesis (fig. 34, *sp.*), so that it may be said that the sperm cells ripen from within outwards.

The absence of any well-defined canals in the gonophore, and the presence of four conical rudimentary tentacles, suggests affinities with Agassiz's sub-genus *Thamnocnidia* (**1** : see **2**, pp. 399–400, 406, and 416), but apart from this it is not possible to find any close affinities with other species of the genus.

TUBULARIA LONGSTAFFI.

(Plate II., fig. 11.)

Locality.—No. 6 hole, April 8th, 1903; 124 fms.

Only a single specimen of this magnificent Tubularian zoophyte was found, and it bears unfortunately only a single hydranth. As it appears to be quite distinct from *Tubularia hodgsoni* and does not agree with any other species of the genus that has hitherto been described, we propose to call it *Tubularia longstaffi.*

Hydrosome.—The hydrocaulus is unbranched and about 2 mm. in diameter at the distal end. It rises to a height of 70 mm. At its base, where it is extraordinarily slender, there are three or four hydrorhizal branches. It is invested by a continuous smooth tube of perisarc. At the base of the flask-shaped hydranth the hydrocaulus is slightly constricted.

Just above this constriction the hydranth expands to form the support of the proximal circlet of tentacles. The tentacles of this proximal circlet are 25 in number and about 12 mm. in length. Just above this circlet of tentacles arise the eight long slender blastostyles.

From the base of the blastostyles the hydranth narrows rapidly to form the conical hypostome surrounded by a dense tuft of distal tentacles, each about 2 mm. in length.

Gonosome.—The eight blastostyles are in the contracted condition of spirit specimens about 14 mm. in length and bear a great number of flattened gonophores. The gonophores are all female, and about 2 mm. × 2·5 mm. in size. They have no radial or ring canals, but, like *Tubularia hodgsoni*, they have four rudimentary tentacles.

Actinulæ with proximal tentacles.

This form appears to be most closely allied to *T. spectabilis* (Agassiz) from the coast of Massachusetts, described by Allman (**2** : pp. 414–5, see also pp. 416–7), in size and general form ; but as the description is not very full, it is not possible to determine the identity of the two species with certainty.

It differs, however, from the description of *T. spectabilis* in having the blastostyles disposed in a single row, and not in two or three rows one over the other.

Moreover, the hydrorhiza of our specimens shows no sign of being "very much contorted, irregularly branched, and densely intertwined."

Corynidae.

Species A.

Locality.—W.Q., McMurdo Bay, February 20th, 1902 ; –20 fms.

A single hydranth was found at the bottom of the bottle containing various hydroids from this locality, which appears to belong to some genus of the family *Corynidae.* Without further evidence than we possess at present we cannot even venture to suggest the name of the genus to which it belongs.

The hydranth is about 0·7 mm. in height, and almost spherical in shape. It has a conical hypostome and six scattered capitate tentacles. The presence of a short stolon or stem at the base of the hydranth suggests that the species is colonial in habit.

No gonophores are present.

Species B.

(Plate III., fig. 17.)

Localities.—W.Q., Hut Point, November 13th, 1902. W.Q., Hut Point, September 27th, 1902. East end of the Barrier, January 29th, 1902; 100 fms.

Three specimens of a solitary (?) coryniform hydranth were found in the bottles containing hydroids from these localities attached to the sponge spicule débris. The hydrocaulus is 3·5 mm. in length. The hydranth is 2 mm. in height and 0·6 mm. in diameter, cylindrical in shape, with short scattered capitate tentacles 0·3 mm. in length. The proximal end of the hydrocaulus is covered by a chitinous perisarc and gives off 3 or 4 hydrorhizal filaments (fig. 17, *hrh. f.*), for attachment to the sponge spicule débris. No gonophores are present.

Bonnevie describes a solitary form, *Coryne gigantea*, from Hammerfest (**7**: p. 15), but this species differs from our specimens in having a hydranth longer than the hydrocaulus and in having the tentacles arranged in groups of three or four instead of singly.

There is some reason for believing, from the evidence afforded by these specimens, that at least two species of Corynidae occur in the Antarctic Sea.

This is an interesting conclusion, as no specimens of the family were obtained by the 'Belgica' or 'Challenger' expeditions, nor has the family been discovered yet in the Falkland Islands. Hartlaub (**10**: pp. 505–509), however, describes two species of *Coryne*, one species of *Syncoryne* and one species of *Gemmaria* from the coasts of Chili, etc.

It is also noteworthy that these few specimens are the only Hydrozoa in the collection with capitate tentacles; it is therefore quite certain that they are not detached zooids from other large colonies that we have found in the collection, and improbable that they represent initial stages in the life history of these large colonial forms.

FAMILY CORYMORPHIDAE.

The genera belonging to this family that are sufficiently well known to be generally recognised are *Branchiocerianthus*, *Monocaulus*, *Corymorpha*, *Lampra*, *Gymnogonos*, *Heterostephanus*.

The genus *Branchiocerianthus* (Mark **15** and **16**) appears to be perfectly distinct, and does not offer any difficulties to the systematist. *Corymorpha* (M. Sars, 1835) and *Heterostephanus* (Allman) differ from the other genera in producing in both sexes free medusiform gonophores. Allman (**2**: pp. 395–6) introduced the genus *Monocaulus* for the species with adelocodonic gonophores described by Sars as *Corymorpha glacialis*, and he included in the same genus *Corymorpha pendula* (Agassiz) and the giant deep-sea species *Monocaulus imperator*.

Bonnevie (**5**: pp. 469–471) in 1898 instituted the genera *Lampra* and *Gymnogonos.* This authoress includes all the species belonging to this group of genera with "medusoid" gonophores in the genus *Corymorpha.* All species with "pseudo-medusoid" gonophores are placed in the genus *Lampra,* and those with "styloid" gonophores in the genus *Gymnogonos.*

This classification appears to us to be reasonable and will probably serve a useful purpose for some years. Difficulties are sure to arise later when species are found with intermediate characters, but at present we can recognise three distinct steps in the degeneration of the medusiform gonophore which may be used for purposes of classification. There is the "medusoid" gonophore showing some evidence of degeneration, but retaining the endocodon or sub-umbrella cavity, the "pseudo-medusoid" gonophore retaining the umbrella wall, but with no sub-umbrella cavity; and, lastly, the "styloid" gonophore with little or no definite trace of medusoid structure.

Lampra parvula.

(Plate III., figs. 15, 16; and Plate IV., fig. 35.)

Localities.—Off Hut Point and Flagon Point in McMurdo Bay. Sexually mature and full-grown specimens obtained from September to December, 1902, and September, 1903. Young specimens obtained January, February, March and October, 1902, and January, 1903. Depth, 10–20 fms.

A great many specimens of this interesting little species were found in several tubes and bottles from the localities named above. They are attached by root-like processes from the basal end to polyzoa (fig. 15) and to a curious felt-work mass of substance that is mainly composed of sponge spicules (fig. 16). Although *Lampra parvula* presents us with the largest hydroid zooid, except those of *L. microrhiza* and of *Tubularia* in the collection, yet they are considerably smaller than the zooids of any known species of *Lampra* or *Corymorpha.* The zooids of the only known species of *Gymnogonos,* however, are only 10–20 mm. in height. Like many other species of Corymorphidae, the colour of the spirit specimens is dark reddish-brown.

In habit the species closely resembles *Lampra socia* (Swenander, **23**: pp. 6–8, figs. 1–2) from the Trondhjem fjord, several specimens being usually found in groups more or less imbedded in the sponge débris mass. A few very young specimens were found attached singly to the stems of calcareous polyzoa (fig. 15), or more rarely to other hydroids. *L. socia* was found attached to the branches of *Lophohelia prolifera.*

Hydrosome.—The height of the full-grown polyps from the base to the mouth is about 30 mm.

In a great many specimens (fig. 16) there is a sudden diminution in the diameter of the polyp about half the distance from the base to the tentacles. The position of the constriction varies a good deal in different specimens, and in some it is hardly noticeable, the stems gradually tapering from the base to the neck. The thicker basal

portion of the polyp is invested by a fairly thick pellicle of very different appearance from the typical perisarc of the *Tubulariidæ*. In many specimens, which have perhaps shrunk in the preservation, the pellicle is only loosely attached to the body wall.

The distal tentacles are very numerous (60-70) and about 1·5 mm. in length.

In the proximal ring there are about 30 tentacles, each about 10 mm. in length.

Gonosome.—The gonophores are situated in compact bunches in close proximity to the inner aspect of the proximal circle of tentacles (fig. 16). They are almost spherical in shape, the female gonophores being about 1 mm. and the male gonophores 0·8 mm. in diameter.

As in other species of the genus, they are "pseudo-medusoid" in character (fig. 35).

In many specimens ova (fig. 35, *ov. rup.*) may be seen somewhat constricted in the middle and obviously rupturing the wall of the gonophore. Bonnevie (**6**: p. 21) states that in *Lampra sarsii* the ova "leave the gonophores at a very early stage of their development and remain for a time attached to the mouth of the gonophores."

LAMPRA MICRORHIZA.

(Plate II., fig. 14.)

Locality:—Off the Barrier, January 27th, 1902; 300 fms.

Though small as compared with other Corymorphidae, this is by far the largest hydranth of the collection.

Unfortunately, the two specimens obtained are in a very bad state of preservation, and although sections of the mass of tissues in the position of the blastostyles have been made, it has been impossible to demonstrate with certainty any gonophore structures. It is mainly on account of the dark brown colour that these specimens are referred to the genus *Lampra*.

Hydrosome.—The hydrocaulus rises to a height of 50-60 mm.; it is about 3 mm. in diameter throughout, and proximally is loosely covered by a thin chitinous pellicle (fig. 14, *c. p.*); at the proximal end it gives off a very large number of extremely delicate processes for attachment (fig. 14, *hrh. f.*). The hydranth is not separated from the hydrocaulus by a constriction. The proximal tentacles are 40–50 in number and about 40 mm. in length; the distal tentacles appear to be about 7 mm. in length, but are matted together and cannot be clearly seen in the preserved specimens.

Gonosome.—Blastostyles branched; 5 (?) mm. in length.

FAMILY MYRIOTHELIDAE.

(MYRIOTHELA ?)

(Plate III., fig. 18.)

Locality:—W.Q., Hut Point, November 13th, 1902.

A single specimen of a hydroid belonging probably to this family was preserved in a separate tube from this locality.

Hydrosome.—A solitary zooid. The hydrocaulus is about 8 mm. in height and about 2 mm. in diameter for the greater part of its length. At the base it is much thinner and gives off numerous hydrorhizal filaments (fig. 18, *hrh. f.*) for attachment to the sponge spicule débris. It is covered throughout its length by a thin chitinous perisarc with transverse striations.

The hydranth is naked, about 6 mm. in length, and spindle-shaped, thickening gradually from the hydrocaulus, and then gradually tapering to form the conical hypostome. The distal half of the hydranth bears numerous short, thick, scattered conical or hemispherical tentacles (fig. 18, *t.*) the largest of which are situated just above the thickest part of the hydranth.

Gonosome.—No gonophores are present.

Although we are unable to give a generic or specific name to this specimen, we are anxious to record the existence of a member of this family in the Antarctic Sea. Hartlaub, in his summary of the Southern Hydroids, does not mention the family at all, but Jäderholm (**13** : p. 2.) records the occurrence of *M. austro-georgiae* from South Georgia.

FAMILY SERTULARIIDAE.

Sertularella spiralis.

(Plate III., figs. 19, 20.)

Locality.—W.Q., No. 10 hole, July 3rd, 1903; 130 fms.

Several fine colonies of this species were obtained from this hole at the date given above. It is perhaps noteworthy that no other specimens were obtained from any other localities, although at this particular spot the species seems to have been so abundant. Unfortunately, all the colonies were torn away from their attachments, so that in some particulars our description must be imperfect.

Hydrosome.—The slender monosiphonic hydrocaulus is 250 mm. or more in height. It is bent alternately right and left at intervals of 5 mm., and at each geniculation two branches are given off from the major angle. Each of these branches is about 40 mm. in length, slightly geniculated and pinnately branched, the pinnules arising as before from the neighbourhood of the angles. Their internodes are about 2·5 mm. in length. In some cases one or both of the branches themselves are elongated to form an axis similar to the main axis and give rise to secondary branches similar to the primary branches.

The general effect of this method of ramification is to give the appearance of a spiral form similar to that so characteristic of the genus *Hydrallmania.*

The pinnules vary in length up to 30 mm. and are divided into a series of internodes by geniculations, but these internodes are not all of the same length (0·6–1·0 mm.), increasing somewhat in length in the distal parts. Proximally the nodes are not very clearly marked.

Each internode of a pinnule bears one hydrotheca at its distal extremity, but each internode of a branch bears three hydrothecæ, one at the distal extremity, and the other two at intervals of one-third and two-thirds from the proximal end.

The hydrothecæ of the pinnules (fig. 19) are about 0·5 mm. in depth, 0·22 mm. in their greatest diameter, and 0·17 mm, in diameter at the mouth, and have three opercular flaps (fig. 19, *op.*) 0·09 mm. in length. They are somewhat shorter than this in the proximal regions of the pinnules. The two proximal hydrothecæ of the internodes of the branches are decidedly shortened as regards that part of their length which is not adnate. The distal hydrotheca of each internode of the branches is nearly straight and barrel-shaped. A single straight hydrotheca, which is not adnate to any part of a hydrocaulus, is situated between the bases of each pair of branches (fig. 20, *hth.*). Apart from these, the main axis bears no hydrothecæ.

A remarkable feature of the hydranths is the presence of a loose sheath of ectoderm (fig. 19, *ect.*) enveloping the base. The hypostome is conical and surrounded by about fifteen tentacles.

Gonosome.—Only female gonothecæ (fig. 19, *gth.*) have been observed. They are 1·0 × 0·5 mm. in size, ovate, smooth, sessile, and attached below the bases of the hydrothecæ of the pinnules. The gonothecæ are all empty, none of the gonophores being preserved. The planulæ are developed in spherical or somewhat pear-shaped acrocysts (fig. 19, *ac.*), 0·4 mm. in diameter.

This species seems to be quite distinct from any that has yet been described.

Sertularella plectilis.

(Plate III., fig. 21.)

Localities.—W.Q., No. 6 hole, February 15th, 1902; 130 fms. W.Q., McMurdo Bay, February 20th, 1902; 20 fms.

Several large, detached, tangled masses of this hydroid were found in the first-named locality; but in the second locality only a single small colony 12 mm. in height attached to the stem of *Campanularia verticillata* was obtained.

Hydrosome.—The hydrocauli are all extremely slender, not exceeding 0·12 mm. in diameter, irregularly branched, and—as they reached us—in an inextricable tangle. The internodes are about 0·6 mm. in length. The branches arise immediately below the hydrothecæ (fig. 21). A single hydrotheca is situated at the distal end of each internode. As many of them are reduplicated (fig. 21, *r. hth.*), they vary considerably in length. The original length of each hydrotheca appears to be 0·4 mm., but one showing four reduplications is 0·6 mm. The greatest diameter is 0·15 mm., and at the mouth 0·13 mm. The wall is adnate to the hydrocaulus for about one-third of its original length. It is extremely thin. The margin has three opercular flaps, 0·06 mm. in length. About fifteen tentacles surround the bluntly conical hypostome of the hydranths.

Gonosome.—The gonothecæ (fig. 21, *gth.*) are immature and about 0·5 × 0·4 mm. in size. They are all female. They arise from the hydrocauli immediately below the hydrothecæ and are sessile. They are smooth, pear-shaped, and have a straight margin. No gonophores can be seen, the ova being embedded in the blastostyles.

This species is also quite distinct.

Dictyocladium fuscum.

(Plate III., fig. 22.)

Locality.—Cape Wadworth, Coulman Island, January 15th, 1902; 8–15 fms. Bottom stones.

Hydrosome.—The single specimen of this species forms a thick, shrubby, fan-shaped colony, 90 mm. in height, 80 mm. in width in the widest part, and about 25 mm. thick, *i.e.*, in a direction at right angles to the line of greatest width and the line of height. The principal branches arise irregularly from the main stem, but the smaller and ultimate branches are flabellate in their mode of ramification. The colony as a whole is rendered more compact than it otherwise would be by the ends of several branches developing stolons (fig. 22, *st.*) which attach themselves to other branches around the bases of their whorls of hydrothecæ. At the base the colony is polysiphonic, but distally the branches are all monosiphonic. The base and hydrorhiza are missing.

The hydrothecæ (fig. 22, *hth.*) are arranged in six rows and almost always in regular verticels of three, but sometimes the three hydrothecæ of a verticel are not quite on the same plane. They are about 0·8 mm. in length and 0·3 mm. in diameter, and adnate for about one-half to two-thirds of their length. They are very slightly constricted towards the opening, the margin is quite plain and often suddenly everted *quite* close to the edge. Reduplication of the hydrothecæ frequently occurs, but the secondary thecæ project *very* little beyond the margin of the primary ones.

The soft parts are quite macerated.

The general colour of the colony is pale brown.

Gonosome.—Unknown.

The species differs from Professor Nutting's diagnosis of the genus (**19**: p. 105) in the absence of any operculum. In the type species of the genus (*D. dichotomum*, Allman; **3**: pp. 76–77; Pl. 36, figs. 2, 2*a*) the anastomosing stolons coalesce with the mouths of the hydrothecæ, the cavities of the hydrothecæ and stolons being continuous; but in our species these stolons always grasp the hydrocauli at the base of the verticels of hydrothecæ. The species differs from both *D. dichotomum* of Allman and *D. flabellum* of Nutting in the shape of the hydrothecæ and in other characters. Unfortunately Allman does not mention whether an operculum is present in his species or not.

FAMILY PLUMULARIIDAE.

Plumularia glacialis.

(Plate III., figs. 23, 24.)

Locality.—" East end of Barrier," January 29th, 1902; 100 fms.

From the nature of the hydrorhiza, which was curved, it seems probable that the specimens of this species were attached to a weed or zoophyte.

Hydrosome.—A stout fascicled hydrocaulus (fig. 23) 300 mm. in height and 2·5 mm. in diameter near the base arises from the densely matted but imperfectly preserved hydrorhiza.

In the constitution of the hydrocaulus there is a single tube (fig. 23, *t. hcl.*) giving off, alternately right and left, hydrocladia which may be 30 mm. in length and are usually divided into two equal branches. Supporting this single tube that bears hydrocladia are several other tubes (*t. sp.*) which bear nematophores only. The supporting tubes do not surround the hydrocladia-bearing tube, but leave it exposed on one side. The hydrocladia-bearing tube is divided into a series of internodes 1 mm. in length, and it becomes free from its supporting tubes at the distal end, so that the hydrocaulus then becomes monosiphonic. In *Plumularia profunda* (Nutting, **18**: pp. 66–67; Pl. VIII., figs. 2–3), to which our species has some affinities, the supporting tubes entirely surround the hydrocladia-bearing tubes, and the internodes are of two kinds, longer ones supporting two hydrocladia and shorter ones bearing only one hydrocladium. Moreover, in *Plumularia profunda* the hydrocladia are supported on processes arising from the proximal end and not from the middle of the internodes as they are in our species.

A short hydrotheca (0·2–0·3 mm. in height), adnate to the hydrocaulus but not adnate to the hydrocladium, is found at the base of each hydrocladium (fig. 23). The other hydrothecæ are cup-shaped, 0·3 mm. in length and 0·2 mm. in diameter at the mouth. One, or sometimes two, arise from each internode of the hydrocladia, and each one is guarded by two nematophores above (*i.e.* distally) and a single one below. The margins of the hydrothecæ are entire.

Although the label of the bottle containing these specimens bears the inscription "has been dry," some of the hydranths are sufficiently well preserved to enable us to make out some features of the structure of the soft parts. The rounded hypostome is surrounded by a single circlet of about fifteen tentacles, each about 0·15 mm. in length.

Gonosome.—The female gonothecæ are 1·0 × 0·5 mm. in size, and have a remarkable shape (fig. 23, ♀ *gth.*). The aperture is found on the distal flattened end of the pear-shaped structure, but instead of being at right angles to the stem, is turned inwards through an angle of 45° so as to face inwards and upwards. This

inversion of the distal end of the gonotheca is also seen, but to a less degree, in Nutting's figures of *P. profunda.*

The male gonothecæ (fig. 24, ♂ *gth.*) are narrow and bluntly ovate. They are not found on the same colonies as the female gonothecæ. They are 1·0 × 0·4 mm. in size.

Each of the female gonothecæ contains one ovum. In *P. profunda*, however, the gonothecæ contain "a number of developing ova" (Nutting, **18**: p. 67; Pl. VIII., fig. 3).

FAMILY CAMPANULARIIDAE.

The character which distinguishes the hydrosome stage of the *Campanulariidae* from the *Sertulariidae* and *Plumulariidae* is the presence of a stalk supporting the hydrothecæ and gonothecæ. It is true that in sub-family *Lafoëinae* no clear distinction can be drawn between the base of the theca and the stalk of the theca, theca and stalk forming a continuous tube, but there are other reasons for associating this sub-family with the *Campanulariidae.*

The separation of *Obelia* and its allies from the *Campanulariidae* is, perhaps, an unsatisfactory feature of our classification, as there is no important difference in the hydrosome stage of many of the *Eucopidae* and that of many of the *Campanulariidae.* The *Eucopidae* have, it is true, free swimming medusiform gonophores and the *Campanulariidae* have not, but, as has been shown by several authors, this distinction is not one which, in the *Gymnoblastea,* can be used even for generic diagnoses. It is certainly doubtful whether it ought to be used as a family character in the *Calyptoblastea.*

SUB-FAMILY CAMPANULARIINAE.

Campanularia verticillata (Linn.), *var.* grandis.

(Plate IV., fig. 25.)

Sertularia verticillata, Linnæus, Syst. Nat., X. (1758), p. 811.
Campanularia verticillata, Hincks, British Hydroid Zoophytes (1868), p. 167, pl. xxxii., fig. 1.

Localities.—McMurdo Bay, W.Q., February 20th, 1902; 20 fms. Flagon Point, January, 1903; 20 fms.

This magnificent new variety of *Campanularia verticillata* was obtained in great quantities on a large brittle worm tube, 400 mm. long by 5 mm. in diameter, from McMurdo Bay, and a small specimen from Flagon Point.

Hydrosome.—The worm tube is thickly covered with a hydrorhizal plexus giving off at frequent intervals polysiphonic hydrocauli, which attain to a height of 170 mm. and a thickness of 2 mm. at the base. The hydrorhizal plexus also bears scattered polyps of the same type as those borne by the hydrocauli. In addition to the specimens still attached to the worm tube an enormous number of loose broken

hydrocauli were found in the bottle. These may have formed part of the colonies attached to the worm tube, and therefore our estimate of 170 mm. for the height of the colony may be considerably less than it should be.

The colonies branch irregularly and rather sparingly, and the hydrocauli are polysiphonic to their distal extremities. At these extremities there appear to be four to six parallel but anastomosing tubes, each of which bears a single hydranth at regular intervals, and as the hydranths of the tubes arise at the same level, they form a series of verticels round the hydrocaulus.

In tracing these tubes down towards the hydrorhiza other tubes appear, which creep over the primary tubes in an irregular manner and bear hydranths at less regular intervals. In the lower parts of the stem (fig. 25) the secondary tubes are more numerous, and play an important part in building up the substance of the thick base.

In some cases stolons in place of hydranths occur in the verticels of the primary stems. These may perhaps give rise to the secondary branches. Single tubes bearing hydranths and gonophores also occur climbing over polyzoa epizoic on the main hydrocaulus.

The bell-shaped hydrothecæ are 0·6 mm. in length and 0·4 mm. in diameter at the mouth. The pedicel of the hydranth is about 1·5 mm. in length, marked throughout its whole length by a spiral groove. The hydranths have 28–34 tentacles, arranged in a double row, and each about 0·3 mm. in length. The gonothecæ are at first 0·8 × 2·5 mm. in size and pear-shaped, but later, when fertilisation has been effected, become flask-shaped and 0·6 × 3·0 mm. in size. They are supported by short spirally marked pedicels.

The specimens differ from the type specimens of the species in the greater size of the hydrocauli, hydranths and gonophores, in the greater regularity of and greater intervals between the verticels of the hydranths, in the well-defined spiral marking of the pedicels, and in the extreme tenuity of the edges of the hydrothecæ, which renders it impossible to determine with certainty whether the margin is or is not dentate, as it is in the type.

Although *Campanularia verticillata* is a common species in European waters, it is not included in Hartlaub's list of Southern species (**10** : pp. 505–509).

CAMPANULARIA EVERTA.

Campanularia everta, Clark, Trans. Conn. Acad., III. (1876), p. 253.

Campanularia everta, H. B. Torrey, Univ. California Public., Vol. I. (1902), pp. 51, 52, pl. iv., figs. 35–37.

Localities.—W.Q., McMurdo Bay, February 20th and 28th, 1902; 20 fms. W.Q., Duct, July 15th, 1902.

This species has been previously described from the Pacific coast of N. America. According to Mr. Torrey it is extremely variable (**24** : pp. 51–52).

It was found in our collection growing on other hydroids, such as *Halecium arboreum*, and also on algæ and polyzoa. It is in some cases continued beyond its support as a tangle of contorted tubes.

Hydrosome.—Unbranched hydrocauli arise from the branching filiform hydrorhiza at intervals to a height of 2·5–10·0 mm. They are usually irregularly annulated above and below, and there is always one well-marked convex annulus immediately below the neck of the hydrotheca. According to Torrey this subthecal annulation constitutes the only constant character of the species (**24** : p. 51).

The hydrotheca is bell-shaped and very constantly 1 mm. in length, but varies considerably in diameter at the distal end (0·4–0·7 mm.) as well as in outline. The margin is usually entire, but may be dentate.

The material was not in a good state of preservation, but apparently the hydranths have about 15 tentacles about 0·6 mm. in length.

Gonosome.—The gonothecæ are pear-shaped (1·0 × 0·8 mm.) and supported by a spirally marked pedicel rising from the hydrorhiza. The gonophores are apparently female, but being badly preserved, details of their structure could not be made out.

We have some hesitation in assigning these specimens to the species *C. everta* of Clark, as they differ in many respects from the original description of the type. But assuming that Mr. Torrey is correct in his statement that the species is very variable, and comparing our specimens with his figures and description, the course we have adopted appears to be a better one than that of founding for them a new specific name. The specimens are clearly more closely related to *C. everta* than to *C. integra*, or any other species of the genus.

Campanularia laevis.

(Plate IV., fig. 26.)

Campanularia laevis, Hartlaub, C., Zool. Jahrb., Supplement VI. (1905), p. 565.

Localities.—W.Q., February 28th, 1902. McMurdo Bay; – 20 fms. W.Q., February 23rd, 1902. Flagon Point.

Several colonies of this very beautiful hydroid were found creeping on the stems of *Halecium arboreum.* The zooids are, with the exception of those of its supporting species, the largest among the Calyptoblasts of the Expedition, and the large bell-shaped hydrothecæ with toothed margins—mounted on their straight but graceful pedicels—are very striking.

Hydrosome.—The creeping hydrorhiza gives rise at intervals to a number of straight, upright, unbranched hydrocauli from 5 to 10 mm. in height. Each hydrocaulus has two or three very obscure annulations at the base, and one clearly marked convex annulation immediately below the hydrotheca.

The hydrothecæ are bell-shaped, slightly curved at the base, and then straight, expanding gradually throughout their whole length. They are from 2·5–3·0 mm. in

length, and from 1·5–2·0 mm. in diameter at the mouth. The margin is armed with 15-20 blunt denticulations. The hydranths are large, but of the usual form in the genus, and provided with about 30 tentacles 1·5 mm. in length.

Gonosome.—The mature gonotheca is 2·5 × 1·2 mm. in size, tall and cylindrical. The proximal part of the gonotheca is slightly swollen, and the distal end almost straight. It is supported by a short annulated pedicel arising directly from the hydrorhiza.

The specimens attributed to Hartlaub's species differ from the type in one or two particulars. The hydrothecæ are not so fully expanded distally, the reduplications (?) of the stem are not so well-marked, and the gonothecæ are very different in shape from those of the specimens from Calbuco.* But without further evidence as to the sex and structure of the gonophores of this type we do not feel justified in creating a special specific name for them.

SUB-FAMILY HALECIINAE.

The genera that are usually included in the sub-family *Haleciinae* (*Haleciidae*, Hincks) are characterised by the rudimentary condition of the hydrothecæ. The tubular structures arising from the hydrocladia surround, like a collar, the base of the hydranths, but are quite insufficient to enclose and thereby afford protection to them when retracted.

It is, in our opinion, unfortunate that the term "hydrophore" has come into general use for this rudimentary form of hydrotheca. There are many examples to be found in the *Calyptoblastea* of hydrothecæ that are not cup-shaped, such as the cylindrical hydrothecæ of *Sertularella formosa* and *Synthecium cylindricum* (*see* Nutting, **19**: p. 14), and it would be practically impossible to limit the use of the term to hydrothecæ that are tubular or cylindrical in shape. The use of the term hydrophore for those hydrothecæ only which are not capable of receiving the retracted hydranth would also be inconvenient. It is, therefore, the best course to adopt to abandon the use of the term hydrophore altogether.

The genus *Halecium* is usually regarded as distinguished from its allies *Diplocyathus* (Allman), *Hydrodendron* (Sars), and *Ophiodes* (Hincks) by the absence of nematophores; but one of us has observed the presence of nematophores on the specimens of *Halecium arboreum* obtained by the 'Challenger' (**3**: p. 10, Pl. IV., figs. 1–3) and now in the British Museum, which were overlooked by Allman, and the specimens which we attribute to the same species have also nematophores. It does not seem to us convenient to again split up the genus *Halecium* into groups containing those which do and those which do not possess nematophores, but rather to add to the characters of the genus, that "nematophores may or may not be present." As regards the use of the term "nematophore," it is necessary to explain that we have adopted the

* On the coast of Chili, approximately 41° S. by 71° W.

plan of regarding it as synonymous with "sarcotheca" and applicable only to perisarcal skeleton. The zooid which the nematophore envelopes (in the case of *Halecium* only very partially) appears to us to be a true dactylozooid, and we have not adopted the use of any of the terms "sarcostyle," "machopolyp," "sarcodal process," etc., suggested by various writers.

The occurrence of the gonothecæ in "coppinia" masses in our specimens of *Halecium arboreum* is a feature of some interest. The number of genera in which this grouping of the sexual zooids occurs is extending as our knowledge advances.

The gonothecæ of the specimens of *Halecium arboreum* and *H. telescopicum* obtained by the 'Challenger' were not observed, but the gonothecæ of *H. flexile*, *H. dichotomum*, *H. fastigeatum*, *H. beanii* and *H. cymiforme* obtained by the same expedition were not in "coppinia" masses. This peculiar grouping of the gonothecæ is not, therefore, a character of the genus, but may indicate a method for the future rearrangement of the species into subgeneric groups.

Halecium arboreum.

(Plate IV., figs. 27, 28, 29.)

Halecium arboreum, Allman, 'Challenger' Reports, Vol. XXIII. (1888), pl. iv., figs. 1–3.

Localities.—The species is evidently abundant in McMurdo Bay, extending from shallow water to depths of 130 fms.

W.Q., McMurdo Bay, February 20th and 28th, 1902; –20 fms. W.Q., Flagon Point, January 17th and February 23rd, 1903; 10–20 fms. W.Q., No. 6 hole, January 31st, 1903; 130 fms. W.Q., February 21st, 1902; 10 fms. W.Q., off cable, February 17th, 1904. East End of Barrier, January 29th, 1902; 100 fms.

The specimens of this species consist of a number of robust colonies rising to a height of 300 mm. from a thick hydrorhizal plexus. A few small colonies from the east end of the Ice Barrier were found attached to the stems of *Plumularia.*

Hydrosome.—The hydrorhiza is a dense plexus of tubes exhibiting a tendency to be grouped together in polysiphonic bundles.

The main stem is a thick polysiphonic hydrocaulus 10 mm. in diameter.

The proximal branches are polysiphonic, like the main stem, and anastomose freely whenever they come in contact with one another. The distal branches are much more numerous and usually monosiphonic. The monosiphonic branches (fig. 27) alone bear the hydrothecæ, but in some cases these branches still bear hydrothecæ after the addition of the first few strengthening tubes.

The ramification of the distal branches is pinnate, and in other parts of the colony it is roughly, but not rigidly, flabellate.

The thickness and roughness of the stem and of the principal branches afford admirable support for the hydrorhizæ of other hydroids, a list of which will be found on page 1.

Up to a height of about 150 mm. the colony consists of only four or five thick (7 mm. in diameter) and occasionally anastomosing stems, bearing a few thinner (3 mm. in diameter) branches which are themselves pinnately branched. Above this region the thick stems branch much more profusely and somewhat pinnately, bearing numerous thinner branches whose method of further ramification is always pinnate.

The ultimate branches (hydrocladia) are jointed, the internodes being 0·6–1·1 mm. in length and about 0·4 mm. in diameter. Each internode bears on one side a single hydrotheca (hydrophore) adnate throughout its whole length, and supporting the base of a hydranth 2 mm. in length (fig. 24, *hyd.*), and on the opposite side a long serpentine dactylozooid (sarcostyle) 1·5 mm. in length and about 0·15 mm. in diameter (fig. 24, *d.*), supported at the base by a nematophore (sarcotheca) 0·15 mm. in length and about 0·15 mm. in diameter.

At the extremity of the dactylozooid there is a battery of nematocysts. In the specimens many of the dactylozooids and nematophores are broken off, but there is little doubt that they are usually, if not regularly, present in the living colony in the position assigned to them. The dactylozooids are very similar to those figured by Hincks for *Ophiodes mirabilis*, although not so clearly "knobbed" at the extremity.

The hydranths are of the typical *Halecium* form. The hypostome is surrounded by a circle of about twenty tentacles each about 0·5 mm. in length.

Gonosome.—The gonothecæ together with some nematophores occur in "coppinia" masses (fig. 28) on the stem and branches. These "coppinia" masses are oval or spherical, densely branched and tangled clumps, 25 × 25 mm. to 60 × 30 mm. in size, having a rough resemblance to the "bedeguar" galls on the stem of the wild rose. The delicate dichotomously ramified branches of these masses bear dactylozooids and nematophores (fig. 29, *d.* and *nph.*) similar to those of the other parts of the colony, and numerous paired gonothecæ (fig. 29, *gth.*), 1·0 × 0·7 mm. in size, which curve sharply backwards, terminating in a hook-like process at the extremity of which is the gonothecal mouth.

The type of this species was found at Kerguelen in 1874.

Halecium tenellum.

Halecium tenellum, T. Hincks, Brit. Hyd. Zoophytes (1868), p. 226, pl. xlv., fig. 1.

Localities.—W.Q., McMurdo Bay, February 20th, 1902;–20 fms. W.Q., Flagon Point, January 17th, 1903; 10–20 fms. W.Q., Flagon Point, February 23rd, 1903. W.Q., off cable, February 17th, 1904. W.Q., D net, June 15th, 1902.

This widely distributed little *Halecium* appears to be fairly common in McMurdo Bay. It is found on sea-weed, *Alcyonium paessleri*, on *Halecium arboreum*, and on other hydroids.

Hydrosome.—The delicate little colonies are about 10 mm. in height and spring from a creeping hydrorhiza. The hydrocauli are monosiphonic, irregularly

annulated and very irregularly branched. They are not more than 0·1 mm. in diameter.

The hydrothecæ are elongated and everted at the margins. They are frequently reduplicated.

The hydranths are 0·5 mm. in length and have about 20 tentacles 0·25 mm. in length. There are no nematophores in this species.

Gonosome.—The gonothecæ are oval (0·8 × 0·5 mm.) or spherical in both sexes. They are situated on short pedicels which may be irregularly annulated as in the British type. They are situated on the hydrocauli in no definite position. There is no evidence of any "coppinia"-like grouping of the gonothecæ.

The species *Halecium tenellum* was obtained by the 'Belgica' expedition in 70° S. by 91° W., and Bale mentions that he has one specimen in his collection from the Australian waters. It has also been found on the south Fuegian coasts and in Smyth Sound (**10**: pp. 505–509). It is common on the British and American coasts and extends into the Arctic seas (Jan Mayen). In fact, it appears to be cosmopolitan in Arctic and Temperate seas.

SUB-FAMILY LAFOËINAE.

LAFOËINA LONGITHECA.

(Plate IV., fig. 31.)

Lafoëina longitheca, Jäderholm, Arch. Zool. Expér. (4), III. (1904), p. iv.

Locality.—McMurdo Bay, February 20th, 1902; 5–20 fms.

Two small colonies of this hydroid were found creeping on the free hydrorhiza of *Perigonimus antarcticus*.

Hydrosome.—A well-developed hydrorhizal filament is attached to the support. From this there arise at intervals tall, cylindrical hydrothecæ (fig. 31) 0·7–1·0 mm. in height, slightly annulated at the base, and gracefully everted at the margin. The margin bears about twelve opercular flaps (fig. 31, *op.*), 0·11 mm. in length. Occasionally secondary hydrothecæ arise from the primary ones and attain an additional length of 0·25 mm. There is no distinct pedicel, the diameter of the hydrotheca at the base being almost as great as it is at the distal extremity.

The hydranths are very small, being in the contracted condition not more than 0·4 mm. in length, or about half that of the hydrotheca. A circlet of about eight tentacles surrounds the blunt conical hypostome. Each tentacle is about 0·13 mm. in length.

Numerous upright nematophores, 0·12 mm. (but occasionally 0·2 mm.) in height by 0·02 mm. in diameter, arise independently from the hydrorhiza. They contain a delicate thread of tissue (fig. 31, *d.*), terminating in a pad at the extremity which is armed with a battery of nematocysts.

Gonosome.—Not observed.

The type of this species was found in South Georgia, in depths of 64–250 metres, and although the author gives no figures, we have no doubt of the identity of our specimens with the type.

FAMILY EUCOPIDAE.

Genus obelia.

Obelia geniculata.

(Plate IV., fig. 30.)

Sertularia geniculata, Linnæus, Syst. Nat. X. (1758), p. 812.
Obelia geniculata, Hincks, Brit. Hyd. Zooph. (1868), p. 149, pl. xxv., fig. 1.

Locality.—Auckland Islands, off Port Ross, March 28th, 1904.

This very widely distributed species was found in the material obtained from the Auckland Islands. It has previously been described from numerous localities north and south of, but not within, the tropics (**10**: pp. 505–509; **3**: p. 23; **11**: p. 151).

It is the only species of Hydrozoa in the collection that we have proved to be phanerocodonic, and it is on that account noteworthy that, notwithstanding the rich and varied hydroid fauna that was brought to light by the Expedition, not a single specimen of this species was found under the ice in McMurdo Bay.

A considerable number of luxuriant colonies were found growing on the frond of a *Laminaria*.

Dimensions.

The height of the largest colony	30 mm.
Height of hydranths	0·4 mm.
Length of pedicels of hydranths	0·25 mm.
Size of gonothecæ	0·9 × 0·25 mm.
Length of tentacles	0·4 mm.

The specimens differ from the common British type of the species in having two (instead of one) annular constrictions in the perisarc of the hydrocaulus above each flexure. They also grow more luxuriantly and branch much more freely than the British type.

Hydrosome.—Stem zigzag, sometimes pinnately branched, two deep constrictions of the perisarc above each flexure. The perisarc below each flexure very thick, forming a series of projections from which the short annulated pedicels arise. Hydrothecæ conical, somewhat longer than they are broad, margin entire, perisarc thick. Tentacles of the hydranth about 30 in number. Gonothecæ axillary, urn-shaped, attached by a short annulated pedicel.

Gonosome.—Each blastostyle bears numerous young scattered medusæ.

Genus campanulina.

The genus *Campanulina* was instituted by Professor E. van Beneden for a species that is known to produce one of the medusæ of the genus *Phialidium.* The hydrosome stage is characterised by the conical hydrotheca closed by an operculum formed of convergent segments of its margin and by the conical hypostome.

The specimens obtained by the 'Discovery' have all the important characters of the hydrosome thus described, and so have the specimens described by Dr. Hartlaub (**9**: pp. 10–11; Pl. I., figs. 8–9) under the name *Campanulina belgicæ,* from within the Antarctic Circle.

The absence of the gonophores in both specimens rendered it impossible for us to determine whether they are or are not phanerocodonic. Even if they had proved to be adelocodonic, however, they should in our opinion be still retained in the genus *Campanulina,* as the case of *Perigonimus antarcticus* may serve as a warning that the setting free of the medusæ is not a character that can be used as absolutely diagnostic of a genus when applied to these sub-glacial species. It is interesting to note in this connexion that Mr. Hodgson (**12**: p. 397) states that *Phialidium* medusæ were abundant in McMurdo Bay.

Campanulina A.

Locality.—McMurdo Bay, February 20th, 1902; 5–20 fathoms.

A single colony of this delicate little hydroid was found growing over a stem of *Halecium arboreum* and over the *Perigonimus antarcticus* which encrusts it.

Hydrosome.—The hydrocauli are slender (0·05 mm. in diameter and 0·5–1 mm. in length), more or less clearly marked throughout with spiral lines, and very occasionally branched. They arise from a creeping filamentous hydrorhiza.

The perisarc at the distal ends of the hydrocauli gradually dilates to form the "ovato-conic" hydrothecæ, 0·4 mm. in length by 0·1 mm. in diameter. The hydrotheca itself is very thin and evidently very flexible. Its margin is deeply cleft to form about eight triangular flaps (0·1 mm. in length), which can close together to form an operculum. It is difficult to determine with any certainty the exact number of these flaps, as they are extremely thin and transparent.

The hydranths, when contracted, completely fill the hydrothecæ. The hypostome is conical and surrounded by a single circlet of about twenty tentacles, 0·2 mm. in length.

Gonosome.—Unknown.

Campanulina B.

Locality.—McMurdo Bay, February 20th, 1902; 5–20 fathoms.

A single small colony of this form was found on *Campanularia verticillata* (var. *grandis*).

Hydrosome.—Only a few hydrocauli of this very small form were found. They are about 0·1 mm. in length by 0·06 mm. in breadth, and arise from a filamentous hydrorhiza. The hydrocauli are much shorter than in *Campanulina A.* and strongly ringed throughout their length. The hydrothecæ are 0·25 mm. in length by 0·15 mm. in diameter and apparently not so flexible as in A.

Their margins are cleft to form about the same number of opercular flaps.

There are about fifteen tentacles, 0·08 mm. in length.

Gonosome.—Unknown.

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DESCRIPTION OF THE PLATES.

KEY TO THE LETTERING OF THE PLATES.

ac., acrocyst ; *bl.*, blastostyle ; *c.p.*, chitinous pellicle ; *d.*, dactylozooid ; *gph.*, gonophore ; *gth.*, gonotheca ; *gz.*, gastrozooid ; *hc.*, hydrocaulus ; *hrh.*, hydrorhiza ; *hth.*, hydrotheca ; *hyd.*, hydranth ; *m.*, manubrium ; *n.*, node ; *nph.*, nematophore ; *op.*, operculum ; *ov.*, ovum ; *p.*, perisarc ; *rhc.*, rhizocaulus ; *sp.*, sperm ; *su.c.*, sub-umbrella cavity ; *t.*, tentacle ; *u.*, umbrella ; *z.*, zooid.

PLATE I.

FIG. 1.—*Perigonimus antarcticus* growing on *Halecium arboreum* (× 2). *hc. H.*, hydrocaulus of *Halecium arboreum ; hyd.*, hydranth of *Perigonimus ; gph.*, gonophore of *Perigonimus*.

FIG. 2.—*Perigonimus antarcticus* ♂ (× 20). *hrh.*, hydrorhiza ; *m.*, manubrium of gonophore ; *p.*, perisarc ; *sp.*, sperm filling the sub-umbrella cavity ; *u.*, umbrella wall.

FIG. 3.—*Perigonimus antarcticus* ♀ showing variability (due to contraction) of form of the hydranths (× 20). *hc.*, hydrocaulus ; *hrh.*, hydrorhiza ; *hyd.*, hydranth ; *m.*, manubrium of gonophore ; *ov.*, ova embedded in the ectoderm of the manubrium ; *su.c.*, sub-umbrella cavity ; *u.*, umbrella wall.

FIG. 4.—*Eudendrium insigne.* Hydranth (× 30). *c.*, collar of deeply staining cells ; *p.*, perisarc.

FIG. 5.—*Stylactis halecii* (× 30). Outer region of colony growing on *Halecium arboreum ; d.*, dactylozooid ; *hc. H.*, hydrocaulus of *Halecium ; hrh.*, hydrorhiza ; *gz.*, gastrozooid.

FIG. 6.—*Stylactis halecii* (× 20). Central region of colony growing on *Halecium arboreum ; bl.*, blastostyle ; *bl.t.*, tentaculate blastostyle ; *gz.*, gastrozooid ; *hc. H.*, hydrocaulus of *Halecium* ; *hrh. P. & C.* hydrorhizæ of *Perigonimus* and *Campanularia.*

PLATE II.

FIG. 7.—*Hydractinia dendritica* encrusting *Halecium arboreum* (× 10). *bl.*, blastostyle ; *gph.*, gonophore ; *gz.*, gastrozooid ; *r.sp.*, ridge-like spine.

FIG. 8.—*Hydractinia dendritica.* Fragment of rhizocaulus (× 20). *bl.*, blastostyles ; *gph.*, gonophore ; *gz.*, gastrozooid ; *rhc.*, rhizocaulus.

FIG. 9.—*Hydractinia dendritica* (× 2). Young rhizocauline colony developing from the encrusting basal region ; *enc. r.*, encrusting region ; *fr. rhc.*, free rhizocauli.

FIG. 9A.—*Hydractinia dendritica,* encrusting *Halecium arboreum* (× 1).

FIG. 10.—*Hydractinia dendritica.* Part of adult rhizocauline colony (× 1). *rhc.*, rhizocaulus ; *z.*, zooids.

FIG. 11.—*Tubularia longstaffi* (× 1). *gph.*, gonophores ; *hrh.*, hydrorhiza.

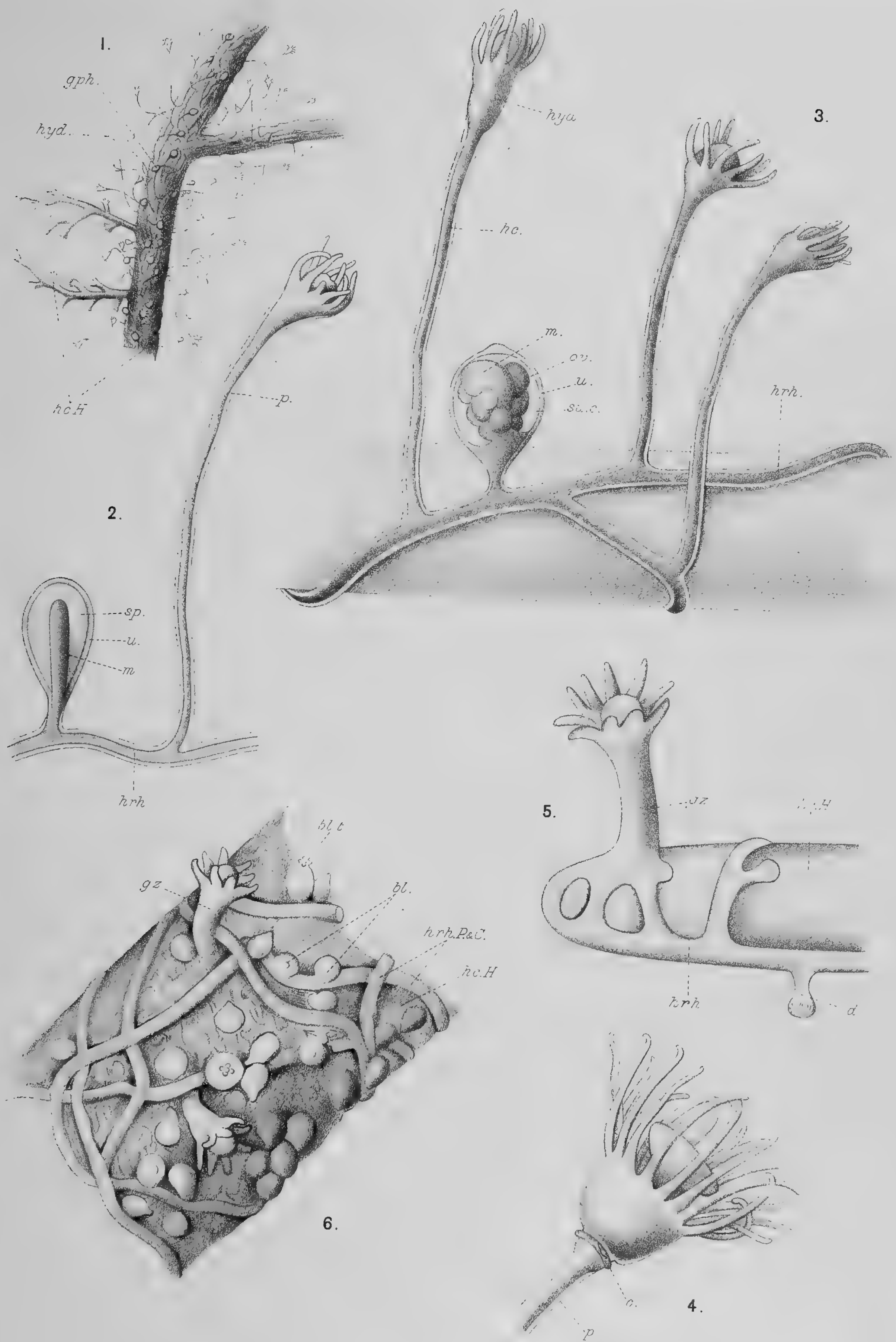
FIG. 12.—*Tubularia ralphi* (× 2).

FIG. 13.—*Tubularia hodgsoni* (× 1).

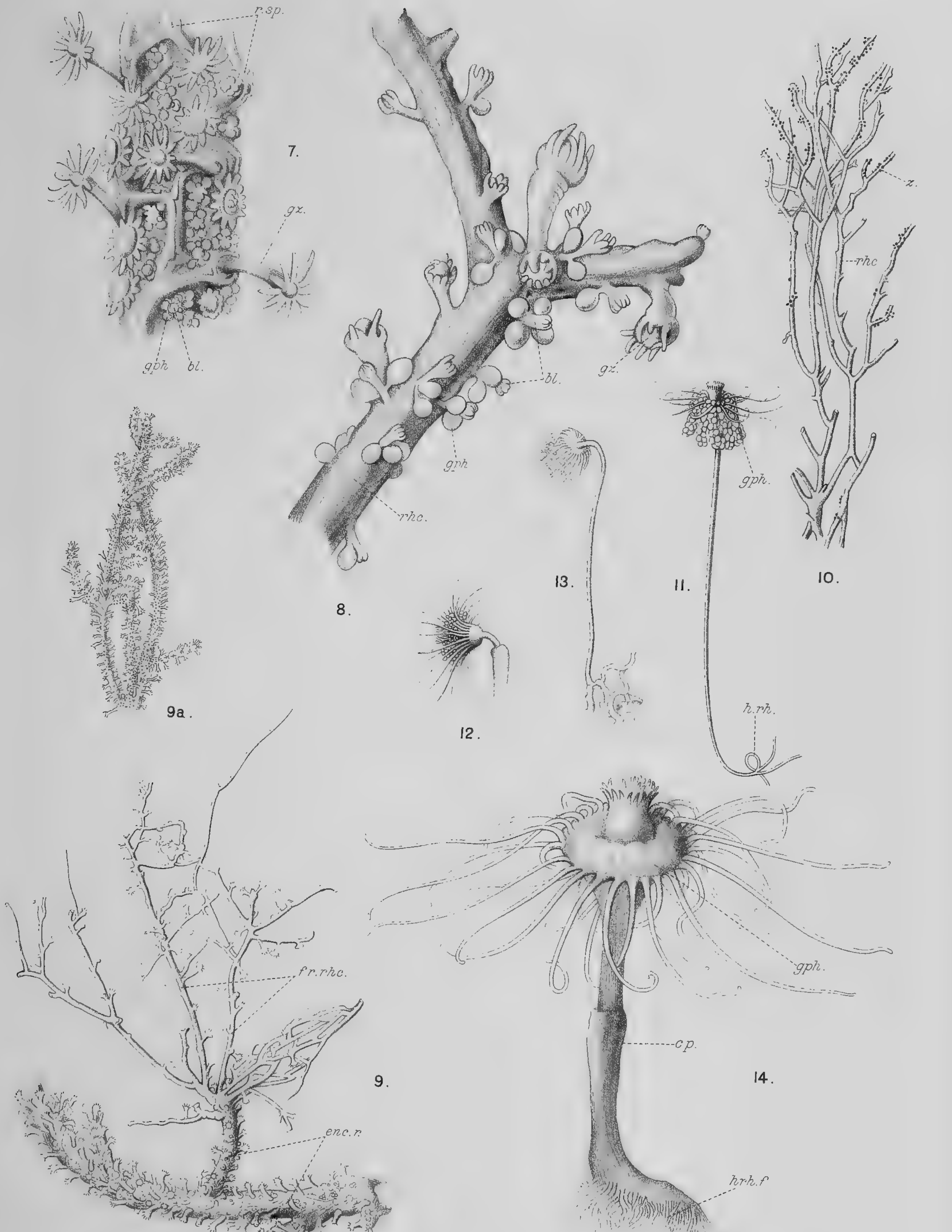
FIG. 14.—*Lampra microrhiza* (× 1). *c.p.*, chitinous pellicle ; *gph.*, gonophores ; *hrh. f.*, hydrorhizal filaments.

PLATE III.

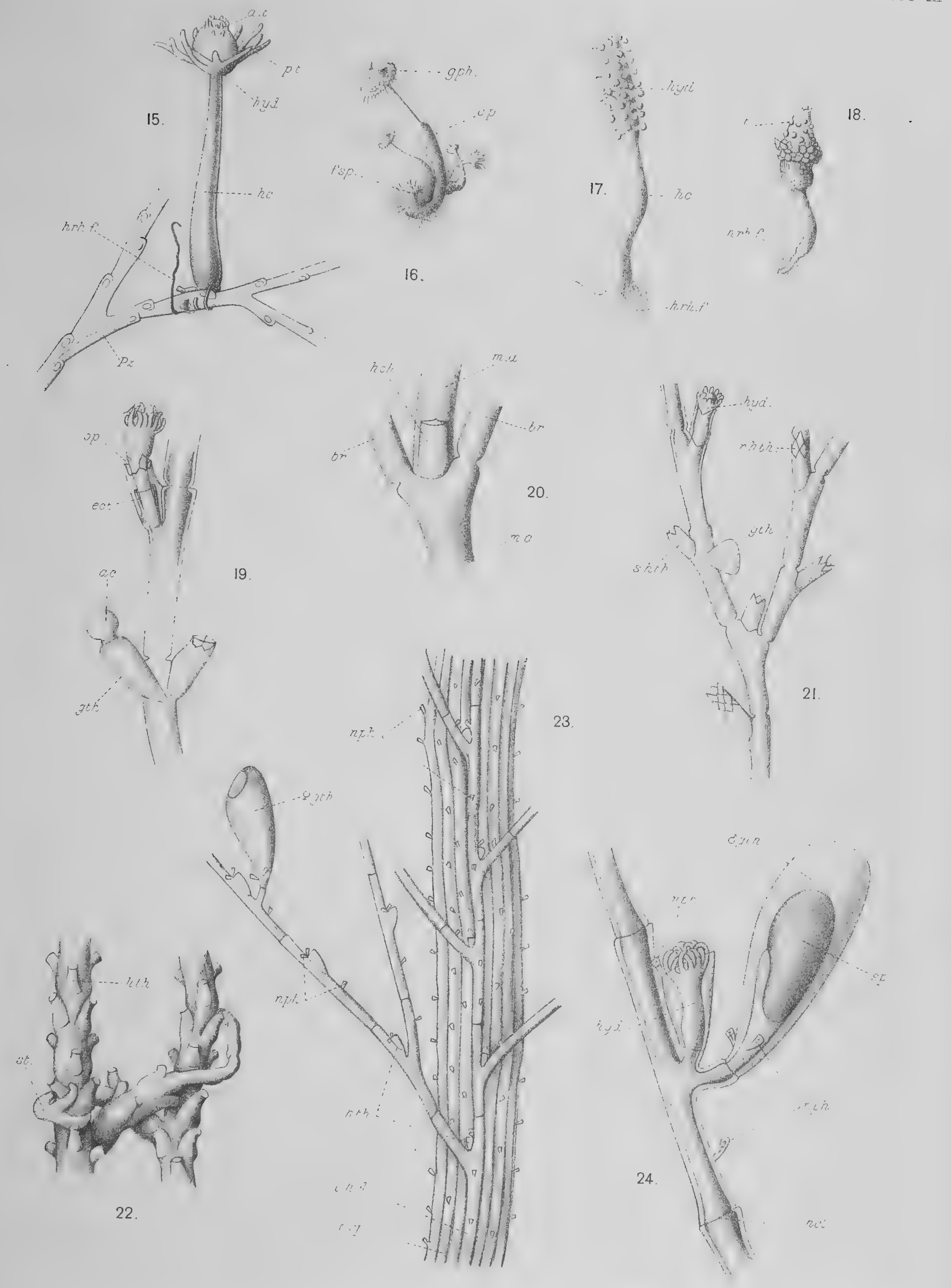
FIG. 15.—*Lampra parvula.* Young zooid (× 10). *d.t.*, distal tentacles ; *hc.*, hydrocaulus ; *hrh. f.*, hyrdrorhizal filament ; *hyd.*, hydranth ; *p.t.*, proximal tentacles ; *P.z.*, polyzoan colony to which the zooid is attached.



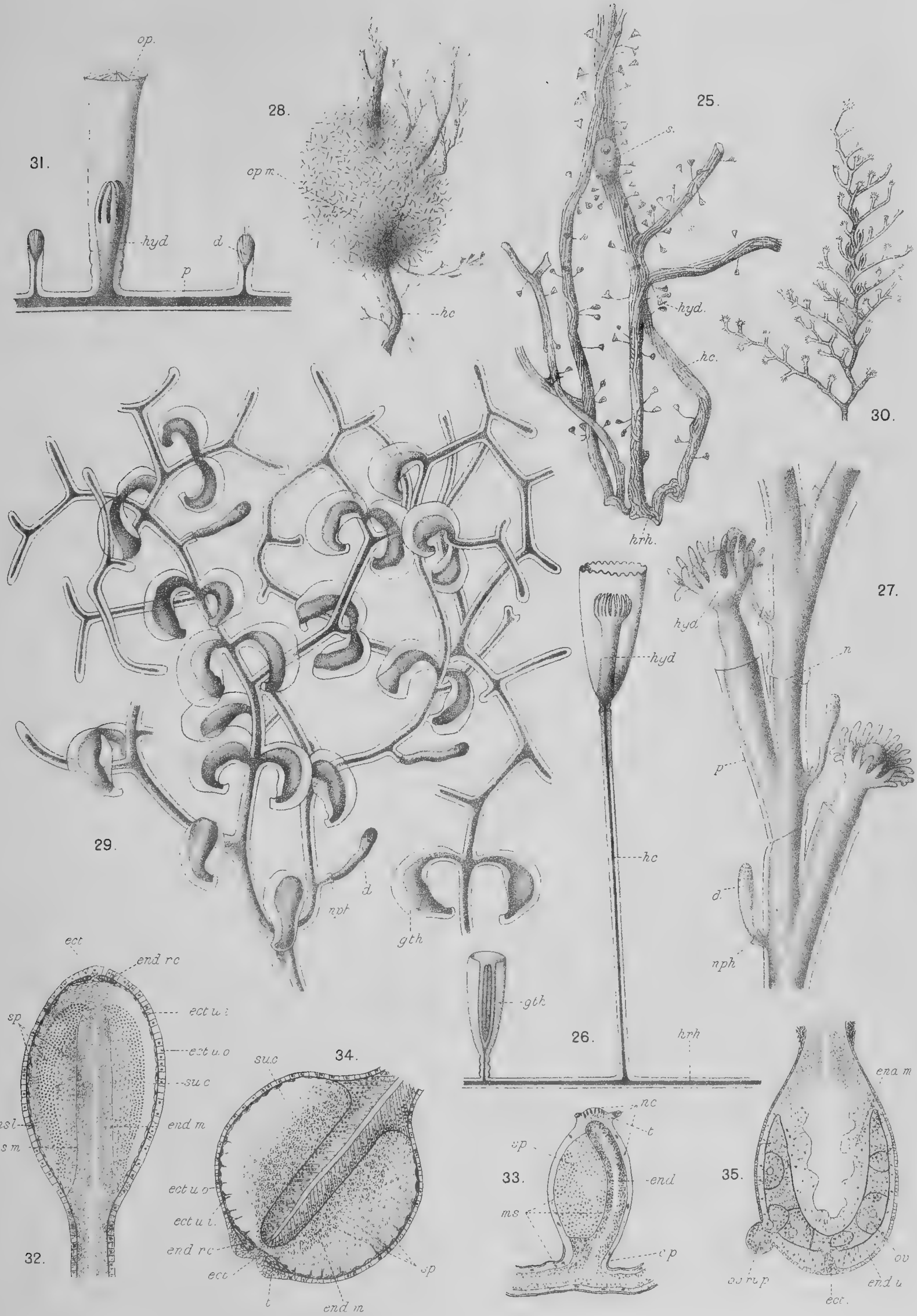
PERIGONIMUS ANTARCTICUS (1-3), EUDENDRIUM INSIGNE (4), STYLACTIS HALECII (5,6).



HYDRACTINIA DENDRITICA (7-10), TUBULARIA LONGSTAFFI (11),
T. RALPHII (12), T. HODGSONI (13), LAMPRA MICRORHIZA (14).



LAMPRA PARVULA (15,16), CORYNIDAE Sp B (17), M[illegible] Sp. (18).
SERTULARELLA SPIRALIS (19,20), S. [illegible] (21) [illegible]
PLUMULARIA GLACIALIS [illegible] 24



CAMPANULARIA VERTICILLATA var. grandis (25), C. LAEVIS (26), HALECIUM ARBOREUM (28, 29), OBELIA GENICULATA (30), LAFOËINA LONGITHECA (31), PERIGONIMUS ANTARCTICUS (27), STYLACTIS HALECII (33), TUBULARIA HODGSONI (34), LAMPRA PARVULA (35).

III.—TENTACLES OF A SIPHONOPHORE.

AMONG the specimens to which Mr. Hodgson, on his return from the Antarctic, directed our attention, was an attenuated object which was the subject of a good deal of speculation. Almost simultaneously with the discovery of its hydrozoic nature, I received a copy of an interesting article by Dr. John Rennie, of Aberdeen,* which settled the question. I print Mr. Hodgson's account of his experiences, as it displays most graphically the difficulties of collecting in glacial temperatures. Dr. Rennie has been so kind as to examine the specimens, and has favoured me with the following note and sketches.—F. J. B.

THE "BOOTLACE."

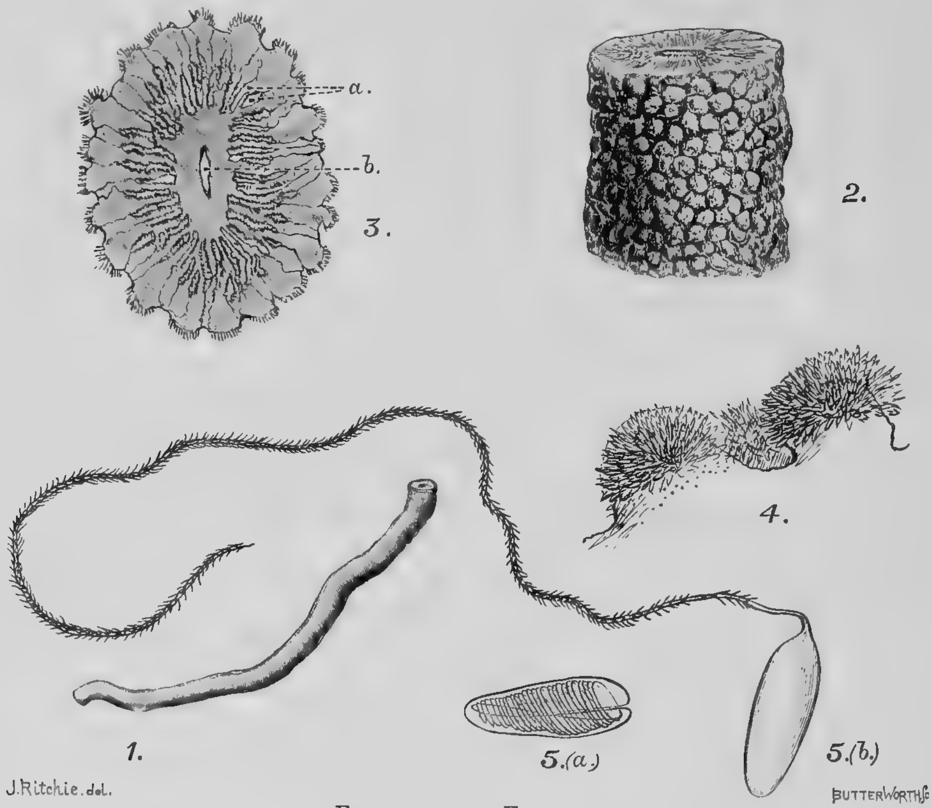
On July 1st, 1902, Lieut. M. Barne, R.N., returning from an excursion sounding through holes in the ice of McMurdo Bay, brought me a specimen of what he termed a "Nemertine," from its superficial resemblance to some more bulky and undoubted nemertines that were constantly being captured. This particular specimen was taken on the sounding-wire some 80 fathoms from the bottom, the total depth of water being 163 fathoms. It was only liberated with considerable difficulty, and arrived on board in an imperfect condition, and, of course, frozen hard. It was about as stout as an ordinary bootlace, somewhat ragged, and of a light brown colour. I judged it to be very nearly twenty feet in length. It so happened that there was no preservative material available at the time, and as sea-water could not be obtained under half an hour, the heat of the ward-room caused the specimen to disintegrate rapidly, and it was lost.

On August 1st, 1902, a stationary trap was hauled at No. 5 hole in 178 fathoms, at a distance of a mile and a half from the ship. On the swabs attached thereto were two specimens of this organism. They lay as tangled masses among the fibres of the swabs, and appeared to be about the same size, or larger, than the original specimen, but stouter and evenly cylindrical throughout. Owing to the hole being choked with ice crystals, no water could be obtained; all specimens had to be brought to the ship "dry." The temperature at this time was $-50°$ Fahr., and under these conditions the specimens were lost.

On December 1st, 1902, at No. 4 hole, the total depth of water being 41 fathoms, a tow-net had been let down to a depth of 8 fathoms. On the line immediately above the tow-net one of these organisms was entangled. As the weather was warm, little

* Scotia Collections.—On the Tentacles of an Antarctic Siphonophore. By John Rennie, D.Sc., University of Aberdeen.

below freezing point, and the water clear, it could be roughly examined before removal. The organism appeared to be an inert and delicate structure, about a quarter of an inch in diameter, which appeared to be uniform throughout its entire length, rounded at both ends, translucent and light brown in colour for the most part, though in places almost colourless. This specimen was secured, but in fragments, preserved in picric acid, and transferred to alcohol. Unfortunately the bottle in which it was kept was one of the only two which failed, and some months later was found to be



EXPLANATION OF FIGURES.

1. Piece of Tentacle. (Natural size.)
2. ,, , enlarged, showing Stinging Areas. × 18.
3. Transverse section: (*a*) Ectodermal Canal; (*b*) Endodermal Canal. × 40.
4. Stinging Areas, showing Cnidoblasts. × 280.
5. (*a*) Cnidoblast, with coiled lasso.
   (*b*) ,, , with lasso shot out. × 500.

practically dry; the specimen was then replaced in alcohol and kept under observation. No other specimen was taken, but from the date of its first capture on Lieut. Barne's sounding-line to the close of our stay in McMurdo Bay it occurred on the lines of the nets and traps frequently, probably not less than fifty times. It was usually much attenuated by being drawn somewhat rapidly through the water, and shredded on the iron bar over which the line ran. This last piece of apparatus was an essential, as the line has to be laid straight out on the ice. A wet line at those temperatures can neither be coiled nor wound on a winch. The organism usually

occupied from ten to twenty fathoms of line as it was drawn up. No time of the year can be definitely stated as to when it was most abundant.

Note by JOHN RENNIE, D.Sc., University of Aberdeen.

The specimens described as "bootlaces" consist of a number of tentacles of a Siphonophore, taken by Mr. Hodgson under the difficulties just described. The state of preservation is not very good, the parts are extremely friable, and break readily on manipulation. It is not possible to tell whether they originally formed one piece* or not. Besides smaller portions, there are nine parts, ranging in length from about 30 cm. to 6 cm., with an almost uniform diameter of 3·6 mm. The surface is in colour a dirty greyish white, and under a low power is seen to be divided up into definitely marked areas (see figs. 1–5), such as distinguish the tentacles found by the Scottish Antarctic Expedition, and described by me.† Cnidoblasts of large size are present in great abundance upon these areas. They possess a lasso, which is at least nine times the length of the cell, and which is barbed throughout its entire length. Ectodermal and endodermal canals of the ordinary type are present, and no further noteworthy features are observable. These tentacles differ from those of the Scottish Expedition, both in colour and consistency, the latter being brownish and of a markedly gelatinous nature even in their badly preserved parts. They appear to belong to a distinct and otherwise unknown form.

* Before being taken from the water the organism was unquestionably in a single piece, and was so whenever it occurred.—T.V.H.

† Proc. Royal Physical Society, Edin. XVI. (1904), p. 25–7.

PORIFERA.

BY R. KIRKPATRICK.

THE Sponges brought home by the 'Discovery' from the Antarctic Region were obtained mostly from two localities, viz., from 183 mètres (100 fathoms) off Coulman Island, about 200 miles north of the Winter Quarters, and from the neighbourhood of the Winter Quarters (Lat. 77° 49′ S., Long. 167° 7′ 4″ E.), from depths ranging from 9 m. to 366 m. (5–200 fms.); one specimen, a new species of Hexactinellida, came from 914 m. (500 fms.) off Mount Erebus, and another, also a new species of the same group, was dredged from 464 m. (254 fms.) when the ship was crossing the Antarctic Circle, on the voyage home; and, lastly, a few Sponges were dredged near the edge of the great Ice Barrier, some degrees eastward of Winter Quarters.

The specimens were procured by means of dredges of various kinds, such as trawls and D-nets, sometimes with tangles attached. Wherever possible, the apparatus was lowered in open water, but after the ship was frozen in, holes were made in the ice; and it was necessary to adopt elaborate precautions to prevent the dredges being lost and to enable them to be dragged along the bottom. By these means there were obtained a large number of specimens, which afford testimony to the indefatigable industry and resourcefulness of Mr. T. V. Hodgson, who was in charge of the dredging operations.

Mr. Hodgson, in his Preliminary Report on the biological collections (**3**, p. 397), observes, "A predominant feature in the fauna was the enormous quantity of sponges and sponge débris, anywhere near the 20-fathom line sponges and sponge débris forming the bulk of the haul as a rule."

The bulk of the collection so far as concerns the size and number of specimens is made up mainly of Tetractinellida and Hexactinellida. There are fifty-nine specimens of Tetractinellid Sponges, some of them of large size, belonging to four species; the 'Belgica' Antarctic Expedition dredging in the neighbourhood of the meridian of 90° W. found none belonging to this group. The Monaxonellida are represented by forty-three species, and the Calcarea by twenty-four species. There are no Keratosa or Horny Sponges.

With the exception of two dried specimens and of a few in formalin, the collection is preserved in strong spirit.

I.—HEXACTINELLIDA.

(7 Plates.)

THE Hexactinellid Sponges, comprising thirty-four specimens and sixteen macerated fragments, all belong to one Family, the *Rossellidæ*. The specimens represent five genera, of which three are new, and ten species, of which eight have not been described before. The following is a list of species with depths and localities :—

FAMILY ROSSELLIDÆ, F. E. SCHULZE.

(SUB-FAMILY ROSSELLINÆ, F. E. Schulze.)

1. *Hyalascus hodgsoni*. Off Mount Terror, 914 mètres (500 fathoms).
2. *Rossella antarctica* Carter. W.Q., 238 m. (130 fms.).
3. *Rossella podagrosa*. W.Q., 18–55 m. (10–30 fms.).
4. *Rossella racovitzæ* Topsent. W.Q., 18–36 m. (10–20 fms.).
5. *Rossella hexactinophila*. Antarctic Circle, Long. 155° 21′ E., 464 m. (254 fms.).
6. *Aulorossella pilosa*. Off Coulman Island, 183 m. (100 fms.).
7. *Aulorossella levis*. W.Q., 18–325 m. (10–178 fms.).
8. *Aulorossella longstaffi*. W.Q., 238 m. (130 fms.).
9. *Anaulosoma schulzii*. W.Q., 36–75 m., (20–41 fms.).

SUB-FAMILY LANUGINELLINÆ, F. E. Schulze.

10. *Anoxycalyx ijimai*. W.Q., 329 m. (180 fms.).

Two species in the above list have been described before: one of these, *Rossella antarctica* Carter (**2**, p. 114), was dredged by Sir James Clark Ross in Lat. 74° 30′ S. Long. 75° E., 549 m. (300 fms.), during the voyage of discovery to the Antarctic Regions in 1839–43; the other, *Rossella racovitzæ* Topsent (**11**, p. 33), was obtained in 1897–99 by the 'Belgica' from Lat. 70°–71° S., Long. 80°–87° W., 450–569 m. (267–310 fms.).

To the one species previously known from the Antarctic, the 'Belgica,' dredging in Lat. 70°–71° S., Long. 80°–89° W., added the following nine :—

1. ? *Caulophacus* sp. 450 m. (246 fms.).
2. *Rossella nuda* Topsent. 430 m. (235 fms.).
3. *Rossella racovitzæ* Topsent. 450–569 m. (246–311 fms.).
4. *Bathydorus spinosus* F. E. Schulze. 569 m. (311 fms.); also from Penguin Island, 2926 m. (1600 fms.) ['Challenger'].
5. *Rhabdocalyptus australis* Topsent. 450 m.
6. *Farrea occa* (Bowerbank) Carter. 450 m.
7. *Eurete gerlachei* Topsent. 450–550 m. (246–301 fms.).
8. *Chonelasma* sp. 450–500 m. (246–273 fms.).
9. *Uncinatera plicata* Topsent. 430–500 m. (235–273 fms.).

All of the eighteen Antarctic species belong to the Hexasterophora, not one representative of the Amphidiscophora having been found hitherto.

In connection with bathymetrical distribution it is interesting to note that specimens of four of the species obtained by the 'Discovery' come from comparatively shallow water, from depths ranging from 18–75 m. (10–41 fms.).

A curious phenomenon remains to be noticed. On October 24th, 1903, Lieutenant Armitage's sledge party found a dried macerated Hexactinellid Sponge and also tufts of spicules being "blown about by the wind amongst the erratics on the ice." The existence of recent Hexactinellid Sponges on the surface of the earth and brought there by natural agencies is a very unusual occurrence; for, generally, these Sponges live in too deep water to be cast up by storms. In the present instance, probably the sea bottom was scooped up by ice, and the material afterwards floated up on detached masses of ice. Both the specimen and tufts of spicules belong to a new species, viz., *Aulorossella levis*, common in shallow water up to 20 fathoms.

Abbreviations and Explanations.

(1) W.Q. means "Winter Quarters."

(2) A Roman and an Arabic numeral in brackets mean number of plate and figure; thus (I. 6) means Plate I., fig. 6.

ORDER HEXACTINELLIDA, F. E. Schulze.

Sub-order Hexasterophora, F. E. Schulze.

Family Rossellidæ, F. E. Schulze.

Sub-family Rossellinæ, F. E. Schulze.

Hyalascus, Ijima.

Hyalascus hodgsoni.

(Plate III. fig. 1, and Plate IV. figs. 1 a–g.)

Sponge an elongated, slightly flattened oval sac, broadest a little above the base, with an oval orifice with thin, soft, felt-like, unarmed edge.

Surface with a few small, pointed, tuft-like conuli; with oxydiactin, and rarely oxypentactin pleuralia. With rounded base provided with short scattered bundles of basalia (probably forming a root-tuft in complete specimens). Gastral membrane continuous (to the naked eye). Autodermalia hexactins, rarely pentactins; hypodermalia oxypentactins with smooth surface. Gastralia slender hexactins. Intermedia holoxyhexasters,* hemioxyhexasters, rarely monoxyhexasters *; discohexasters, and microdiscohexasters. Colour (in spirit), pale buff; consistence rather soft and flexible, but firm enough for the walls to be self-supporting when out of spirit.

Description of the specimen. The single specimen representing the new species appears to be in an incomplete state, and has probably been denuded of many pleuralia,

* The term monoxyhexaster is used for oxyhexasters in which all the secondary or terminal rays are single, hemioxyhexasters (Ijima) being oxyhexasters in which only one, or some, but not all, of the terminal rays are single, and holoxyhexasters oxyhexasters with all the primary rays ending in more than one terminal ray; similarly, the terms holodiscohexaster, hemidiscohexaster (Schulze), and monodiscohexaster explain themselves. Prof. Ijima's view (**4**, p. 118, footnote) that the first kind of spicules, viz., monoxyhexasters, should be designated "hexasters" and not "hexactins" (Schulze, **9**, pp. 8–11) seems to me justifiable. Firstly, the axial canals are confined to the basal portion of each ray (primary ray) and do not extend to the terminal portion (secondary ray). I have examined numerous monoxyhexasters and some monodiscohexasters, and by using a 12-inch oil immersion and by adjusting the light, I have invariably found that the axial canal comes to an abrupt end not far from the

and possibly also of a root-tuft. A few external (? velar) hypodermal oxypentactins are present on the surface, and little tufts of broken-off basalia project from the rounded base of the specimen. There may be a well developed root-tuft in complete specimens; further doubts on this point were suggested by the condition of four specimens of a species of *Craniella* from the Antarctic, three being almost smooth at the lower end, owing to the root-tuft having been detached in dredging, whereas the fourth has a large root-tuft.

The dimensions of the specimen are as follows :—Height, 14cm.; greatest breadth, 6cm.; diameter of orifice, which is slightly torn, about 4cm.; greatest thickness of wall, 1·1cm.

The lumen of the deep gastral cavity is occupied by numerous scattered internally projecting pleuralia, which have been driven in from the outside. The circular openings of the ostia, about 1·5mm. in diameter, are clearly visible beneath the dermal layer; also the slightly larger postica are perceptible beneath the gastral layer, which roofs them over with a fine lace-like reticulum.

Skeleton. The skeletal framework is formed of bundles of diactins; there are no large hexactins.

Spicules. The principalia are oxydiactins, about 7000 × 80μ in size, with fine tapering ends smooth or only very slightly spined. A much smaller kind, 1400 × 18μ, separate, and not in bundles, with roughened ends and four central knobs, is common beneath the dermal and gastral membranes.

The **autodermalia** (IV. 1a) are spined hexactins, each ray being 131μ in length and 15·5μ broad at the base, slightly tapering to a blunt extremity; pentactins (IV. 1b), with the odd ray proximal, occur, but very rarely.

The **hypodermalia** (IV. 1d, d^1) are oxypentactins with slender smooth tapering paratangentials, each about 2700 × 40μ, the rays being either orthotropal or anorthotropal.

The **autogastralia** (IV.1d^2) are spined hexactins with slightly longer and more slender and sharply pointed rays than the autodermalia, each ray being 136 × 7·5μ.

The **intermedia.** Holoxyhexasters* (IV. 1e) and hemioxyhexasters (IV. 1e^1), varying in diameter from 100 to 120μ, are common. Monoxyhexasters* (IV. 1e^2), 108μ in diameter, occur only rarely. Medium-sized holodiscohexasters (IV. 1f, f^1), from 80–100μ in diameter, are also rare; the short slender primary rays, about 7μ in length,

base of the ray, and that the remaining portion of the ray is devoid of any trace of an axial canal, that it is, in fact, more of the nature of a spine. Secondly, in many instances, all the transitions can be traced from holohexasters, through several grades of hemihexasters to monohexasters. In a preparation of *Rossella racovitzæ* Topsent, for example, these transitions can be traced in a crowd of discohexasters, the monodiscohexasters having short thick primary rays with the axial canal extending only to the point where the thick portion (primary ray) joins the more slender solid terminal portion. To call such spicules as these last discohexactins would be to lose sight of the fact that they clearly have six primary and six single secondary rays, for the latter do not lose the character of being secondary simply because they are single. A genuine hexactin would, by its definition, have no secondary rays. The designation "hexactinose," used by Ijima, would, perhaps, be better written "hexactinoid," or hexactin-like, but even this term is not without objection, since such a spicule with its primary and secondary rays is seen, under a high power, not to resemble a true hexactin. Accordingly the prefixes "holo-," "hemi-," and "mono-," added to "oxy-" or "disco-" hexaster, are suggested as indicating and defining the form and relationship of these spicules. The following figures show the limitation of the axial

divide into two or three terminals tipped with toothed discs. Microdiscohexasters (IV. 1g), 43μ in diameter, have slender primary rays, each 6·5μ in length, ending in a plano-convex capitulum,† from the distal convex surface of which are given off disc-tipped terminal rays of two lengths.

This species is placed under *Hyalascus* on account of the absence of calycocomes, this negative character being the chief one which separates the genus from *Rossella.*

The three other known species of *Hyalascus* (**5**, p. 87), viz., *H. sagamiensis* Ij., *H similis* Ij., and *H. giganteus* Ij., are Japanese. They are all vase- or sack-shaped ; the first-named species is vase-shaped, has an orifice with everted lips, and is much contracted below ; the second, which Ijima regards as possibly identical with the first, has a basal stalk ; the third is in the form of a large flattened sac with a plain orifice. In all the Japanese species the autodermalia are mainly pentactins, but in the Antarctic species these spicules are mainly hexactins, pentactins being very rare.

Near the lower end of the sponge is a small conical elevation about 1·3 cm. in height, with a central axis of diactins. The autodermalia have here undergone a remarkable change (IV. 1c–c^2) ; they have become more or less fused together, and have lost one or more of their rays, while the spines resemble the flat articular surfaces and tubercles on the desmas of Lithistid Sponges. All the stages of transition can be traced from a slightly modified pentactin to a long desma-like form, such as that figured in Plate IV., fig. 1c^2. Probably these changes have resulted from irritation set up by contact with some foreign body, just as basidictyonalia form at the point of attachment of many of the Hexactinellida. On another part of the dermal surface is a small round patch, 1·5 cm. in diameter, lighter in colour than the rest of the surface, occupied by small densely crowded autodermalia. Ijima (**5**, p. 90) refers to similar patches on the gastral surface of *H. sagamiensis,* " due to excessive local accumulations of gastralia."

Dredged from 914 mètres (500 fathoms) off Mount Erebus.

Rossella antarctica.

(Plate I., figs. 1 to 4, and Plate IV., figs. 2a to g, and 3a to k.)

1872 *Rossella antarctica*, Carter (**1**, p. 409, pl. xxi.).
1875 ,, ,, (**2**, p. 114, pl. x., fig. 4).
1887 ,, F. E. Schulze (**6**, p. 139, pl. lv.).

Three specimens of this species were obtained. They were brought up in the same haul from Winter Quarters, No. 10 hole, 130 fms. The specimens show a

canals to the primary rays, and the spine-like nature of the secondary rays:—Pl. IV., fig. 2d$^{4-5}$ shows an hexactin-like monoxyhexaster with the axial canals extending but a very short distance from the centre, the rest of each ray being solid. Pl. VII., fig. 1h, shows a monodiscohexaster with the axial canals extending only to the end of the basal thick portion of each ray. Pl. IV., fig. 3d^6 shows three spheroidal reduced hexasters in which the primary rays have disappeared as rays, while the secondary rays remain as one or more spines, or even spheres, attached to the central sphere, the axial canals being confined to the central node or sphere. Pl. IV., fig. 3d^4 (on the left edge of the plate) shows a monoxyhexaster in which one of the six secondary rays is becoming reduced, this being a stage on the way to becoming a spheroidal reduced hexaster.

† The descriptive term " capitulum " is suggested for the enlargement or swelling at the distal end of the primary rays of calycocomes, aspidoplumicomes, strobilocomes, microdiscohexasters, etc. The shape of the " capitulum " in these spicules calls to mind the receptaculum and capitulum of the Compositæ.

considerable amount of variation, and will be described separately as A, B, and C. Had they not come from the same spot, I would probably have regarded B and C as representing a variety of the typical form. All the specimens possess a well-developed root-tuft, therein differing from those obtained from Kerguelen and other localities in the Southern Indian Ocean, and from near the mouth of the Rio de la Plata in the South Atlantic. Prof. Schulze mentions in the 'Challenger' Report (p. 139) that he had never found the loose root-tuft, which Carter represents in his diagrammatic figure (**2**, pl. x., fig. 4), and he considers this modification in the original specimen to be conditioned by the looser nature of the substratum.

Prof. Ijima observes (**5**, p. 5) that "a case of one and the same Hexactinellid species being firmly fixed when growing on a hard substratum, but producing a root-tuft when living on a soft bottom, has never as yet been shown to exist." The 'Discovery' and 'Challenger' specimens of *Rossella antarctica* seem to me to furnish instances of specimens of the same species being fixed solidly or by a root-tuft in accordance with the nature of the bottom. In spite of the considerable range of variation in bodily form, mode of fixation and spiculation, the Antarctic and the more northerly forms appear to me to come within the limits of one and the same species, but I regard the latter as belonging to a variety—*var. solida.* The microdiscohexasters, too, are considerably larger in the typical Antarctic specimens than in the northern variety. If the anchor spicule figured by Schulze (**6**, pl. lv., fig. 12) really belongs to the specimen from which it was obtained, its presence suggests that the sponge, now solidly fixed without a root-tuft, was derived from a form with such an appendage.

Specimen A.—(Plate I., fig. 1, and Plate IV., fig. 2 a–g.)

This, which is the smallest of the three specimens, closely resembles the original one obtained by Sir James Ross and diagrammatically figured by Carter (**2**, pl. x., fig. 4). The total length is 7 cm., the body being 4 cm., the root-tuft 2 cm., and the oral fringe nearly 1 cm. in length. The greatest breadth is 3 cm. The velum is about 7 mm. from the surface of the body. Numerous oval or pyriform buds, each about 2 mm. in length, are present amidst the dense tangle of the velum. The orifice is narrow, oval, about 1 cm. in length, and acute-angled at each end. The diactin marginalia surrounding it form a sloping palisade which meets in the middle line above, the inclination increasing from without inwards. The root-tuft, which encloses débris of worm-tubes, fragments of Polyzoa, etc., is formed of pentactins in the shape of four-pronged anchors with thick curved prongs. The surface of the body is level, though here and there small, barely perceptible conuli occur. The **skeleton** is mainly formed of long wavy bundles of slender diactins.

Spicules.—The **principalia** are long slender diactins, often with roughened, rounded or bulbous ends. There are also parenchymal regular hexactins (IV., 2a) scattered about. The **marginalia** are sharp-pointed oxydiactins 1·5 cm. long and 160 μ thick. The **basalia** are long, slender, four-pronged anchors 4 cm. in length, with

curved prongs 459 μ in length. The **autodermalia** (IV., 2 b–b^2) are hexactins ($2b^1$), pentactins (2b), and rarely stauractins ($2b^2$), each ray being $75 \times 11\ \mu$, wholly spined, nearly cylindrical, and with blunt end. The pentactins have a well-developed distal spiny knob. The **hypodermalia** are slender oxypentactins with paratangential rays with roughened surface and with large prickles. These well-known spicules are not figured owing to want of space. The **autogastralia** (IV., 2c) are large slender hexactins, each ray being $173 \times 6\ \mu$. Some of the hexactins, a little below the surface, are very large, with the radial rays (each $252 \times 21\ \mu$) longer than the other four. The **intermedia.**—The holoxyhexasters (IV., 2d, d^1), hemioxyhexasters (IV., $2d^2$), and monoxyhexasters (IV., $2d^3$, $2d^4$), about 164 μ in diameter, have very slender roughened rays, the primary rays being very short or almost absent. The calycocomes (IV., 2f) are 80 μ in diameter, with long tuberculated primary rays, each 22 μ in length, ending in a solid hemispherical capitulum from which the only slightly divergent secondary rays proceed, presenting, as Carter put it, a dinner-fork-like aspect in optical section. Another kind of calycocome (IV., 2g) has shorter, thicker, and smoother primary rays, a knob-like capitulum, and more divergent secondary rays. Medium-sized holodiscohexasters, like those figured by Schulze (**6**, pl. lv., fig. 15) do occur, but rarely. Plate IV., Fig. 2e, shows a modified hemidiscohexaster 45·5 μ in diameter, having bulbous primary rays, and terminal discs little more than a circle of spines. The microdiscohexasters (IV., 2h), 50 μ in diameter, have long primary rays 10 μ in length, ending in a conical point, the secondary rays being given off in two circles a little separated from each other.

Scattered over the outer surface of the upper part of the specimen are numerous small flattened pyriform buds about 52 mm. in length, each bud being supported on one or two pleuralia which penetrate it. None of the buds are sufficiently developed to show oscule or central cavity. The hypodermal oxypentactins have their paratangential rays much more curved than in the adult state, and the prickles are hardly at all developed. The soft tissues appear much contracted by the strong spirit. A section shows an outer trabecular layer surrounding a central mass of choanosome, there being only a slight development of an inner trabecular layer, and that so contracted as to appear solid rather than reticular.

Specimen B.—(Plate I., fig. 2, and pl. IV., fig. 3h.)

This is a large spheroidal sponge, 15·5 cm. in height, with a dense velum resembling a tangled thicket, extending about 1·1 cm. away from the surface, and with a thick root-tuft. The orifice, which is oval and with sharp angles at each end, is 3·7 cm. in length by 1·4 cm. in its greatest breadth.

The marginalia, projecting about 2 cm., lean towards each other across the orifice, the innermost layer extending almost horizontally across from one side; on a level with the oscule is a depression, looking like a second oscule, but the appearance is due

to the presence of a worm-tube in the wall of the sponge, thereby leading to a disarrangement of the pleuralia and velum.

The gastral cavity is capacious, and is lined by a continuous gastral membrane. The wall of the sponge is about 2 cm. thick. The spicules, with certain exceptions, resemble those of specimen **C** described below.

Specimen C.—(Plate I., figs. 3, 4 and pl. IV., figs. 3a–3l, excepting 3h).

This is a remarkable twin specimen, ovate spheroidal in shape, and with two oscules. The height is 14 cm. and width 19 cm. The massive, dense root-tuft is 5·5 cm. in length. The edges of the oscules are slightly inverted, so that the innermost marginalia, projecting 2·5 cm., slope downwards and inwards. A vertical section through the line joining the oscules shows the sponge body, apart from the massive root-tuft, to be somewhat hour-glass-shaped with the long axis horizontal.

The common gastral cavity is nearly divided into two by a thick, central, pyramidal boss reaching from floor to roof, but not forming a complete partition.

The wall of the sponge attains in one part the great thickness of 3·8 cm. The gastral surface shows numerous circular orifices, from 1 to 3 mm. in diameter, in this respect differing from other known specimens of this species, in all of which the gastral surface is covered with a continuous layer.

The twin condition of the specimen cannot be regarded as one of any specific importance. Among the specimens of *R. antarctica* obtained by the 'Challenger' from 274 m. off Kerguelen Island is a twin specimen with a short common base whence spring two thick cylindrical tubes; the shape somewhat resembles that of a gigantic tuning-fork. The gastral cavities communicate through an oval foramen below, and the gastral membrane is continuous throughout.

Spicules of **Specimen C.**—The **principalia** are diactins with rounded or bulbous, roughened ends, and large regular hexactins with smooth tapering rays each 640μ in length.

The **marginalia** are smooth, thick, fusiform diactins, about 4 cm. in length, and 270μ in thickness in the middle.

The **basalia** (IV. 3a, a^1) are anchor pentactins with four prongs, usually curved, but sometimes straight. Both in **B** and **C** these anchor spicules are present among the hypodermalia some distance above the root-tuft, and some have the prongs anorthotropal, thus supporting Schulze's supposition that pentactin basalia are often modified hypodermal pentactins.

The **autodermalia** (IV. 3b.) are chiefly pentactins with or without a distal knob; hexactins being fairly common in **B**, but rare in **C**.

The **oxypentactin hypodermalia**, as might be expected, are larger than in specimen **A**, and have thicker rays with longer prickles.

The **autogastralia** (IV. 3c) are mainly hexactins with spined, blunt-ended rays,

each 83 × 11μ; in **C** autogastral pentactins (IV. 3c[1]) are, in addition to the hexactins, quite common.

On re-examining the autogastral hexactins of **A**, **B**, **C**, I find the differences are not so great as is depicted in IV. 2c and IV. 3c. The spicule shown in IV. 2c has exceptionally long and slender rays, and that shown in IV. 3c has exceptionally short and blunt rays. In specimen **B** the rays (266 × 15μ) are slender, sharp-pointed and slightly spined.

Intermedia. The holoxyhexasters, hemioxyhexasters and monoxyhexasters show a considerable amount of variation and abnormality, especially in the twin specimen **C**. The holoxyhexasters and hemioxyhexasters are on an average from 100 to 110μ in diameter; fig. 3d shows a small holoxyhexaster (in optical section) only 62μ in diameter. Usually the primary rays are small but distinct. The monoxyhexasters (IV. 3d[3-4]), 126μ in diameter, have sharp-pointed secondary rays with rough surface, are broad at the base and tapering to a sharp point. The abnormal spicules figured in fig. 3d[6] have the primary rays reduced to a central node or sphere, and the secondary rays to a few spines. In some hexasters (IV. 3e) the secondary rays terminate in two or three sharp prickles.

3d[5] shows a stauractin-like monoxyhexaster, 145μ in diameter, the rays having a roughened surface. That these spicules are not young autodermal stauractins is shown by the fact that the axial canals extend only a short distance from the centre.

The calycocomes (IV. 3f–h), 80 to 90μ in diameter, show considerable variation, not only in specimens **B** and **C**, but also in the same specimen, viz., variation in size, in length and thickness of the primary rays, in the length and degree of divergence of the secondary rays, and in the presence or absence of terminal disks. Fig. 3h, from specimen **B**, is evidently abnormal; here some of the secondary rays have fine bifid or trifid terminations.

Hemidiscohexasters of medium size (IV. 3e, e[1]), average about 85μ in diameter; the rays are sometimes thicker and straighter than is usual in this species.

Monodiscohexasters, 90μ in diameter, occur rarely. Prof. Schulze figures (**6**, pl. LV., fig. 8) a spicule of this kind—the only one found by him—from a specimen from Kerguelen Island.

The microdiscohexasters (IV. 3k), 50μ in diameter, are mostly similar to those in specimen **A**, with a narrow conical capitulum, whence two circles of secondary rays originate; some, however, have a more disk-like capitulum (IV. 3l); the secondary rays in both kinds are extremely slender, being almost invisible under any object-glass lower than $\frac{1}{12}$ inch. Curiously enough, these rays are much more easily discernible in the younger and less developed specimen **A**.

All from W.Q., June 3rd, 1903. No. 10 hole; 238 m. (130 fms.).
Other specimens have been found at :—
Lat. 77½° S., long. 175° W.; 548 m. (300 fms.); Sir J. C. Ross's Expedition.
Prince Edward Island, 256 m. (140 fms.); Voy. 'Challenger.'

SOME OF THE CHARACTERS OF THE VARIOUS SPECIMENS OF *Rossella antarctica* ARE TABULATED BELOW.

	Specimen described by Carter, and Specimen A, 'Discovery.'	Specimens B and C, 'Discovery.'	Southern Indian Ocean, 'Challenger.'	S.E. Atlantic, Station 320, 'Challenger.'
Shape of Specimen, etc.	Oval, Single.	Spheroidal, Single or Double.	Cylindrical or Barrel-shaped, Single or Double.	Cylindrical, Single.
Root-tuft	Present.	Present.	Absent.	Absent.
Surface conules . .	Scarcely perceptible.	Scarcely perceptible.	Fairly well marked.	Fairly well marked.
Autodermalia . . .	Pentactins with distal knob. Hexactins not uncommon. Stauractins very rare.	Pentactins with or without distal knob. Hexactins very rare.	Pentactins without distal knob. No hexactins.	Pentactins without distal knob. No hexactins.
Autogastralia . . .	Slender hexactins.	Hexactins in B. Hexactins and Pentactins in C.	Hexactins.	Hexactins.
Oxyhexasters . . .	All slender, and with primary rays short or absent. Monoxyhexasters with slender rays.	Thicker, with longer primaries. Monoxyhexasters, thick-rayed and abundant.	Monoxyhexasters abundant and with thick rays.	Monoxyhexasters abundant and with thick rays.
Calycocomes . . .	With long, slender, tuberculated primaries, and dinner-fork-like secondary rays. Diameter, 85 μ. Also a form with divergent rays.	Primary rays thicker, smoother, and relatively shorter. Diameter, 80–100 μ; rarely 175 μ.	With short, smooth primary rays; secondary rays more divergent. Diameter, 112 μ.	With short, smooth primary rays; secondary rays more divergent. Diameter, 84 μ.
Discohexasters . . .	Very rare; also abnormal forms with bulbous primaries.	Rare, often abnormal, with thick, straight, secondary rays.	Common, with slender, curved rays.	Common, with slender, curved rays.
Microdiscohexasters .	Diameter, 50 μ.	Diameter, 50 μ.	Diameter, 40 μ.	Diameter, 40 μ.

All the specimens have a velum of oxypentactins having paratangential rays with roughened surface and prickles. The Antarctic specimens have a root-tuft, but the northerly ones (*var. solida*) are solidly fixed.

Possession Island, 384 m. (210 fms.); Voy. 'Challenger.'
Kerguelen Island, 274 m. (150 fms.); Voy. 'Challenger.'
East of Buenos Ayres, 1097 m. (600 fms.); Voy. 'Challenger.'

ROSSELLA PODAGROSA.

(Plate III., figs. 2, 3, and Plate V., figs. 1a–m.)

Sponge cylindro-conic, broadest about the middle, with wide, oval, thin-edged orifice, armed with upright marginalia; the walls thick and firm, with a well-developed root-tuft, composed of diactins and of oxypentactins of the same character as those of the velum. With a velum about 5 cm. from the surface; with buds of considerable size, solidly attached to the parent by a broad base. The hypodermalia oxypentactins with rough or smooth rays, without prickles.

The calycocomes with relatively short primary rays; discohexasters with long secondary rays.

There are ten specimens of this species, one of large size, four of medium size, and five small ones, some of which are probably detached buds. All the larger and three of the smallest specimens possess relatively large buds, with oscule and gastral cavity, and fixed by a broad base; compared with these, the buds on one of the specimens of *R. antarctica* (see page 7) are very small, being only 2 mm. in diameter, and detached from the main body, though still adherent to the pleuralia. The largest specimen (Pl. III., fig. 2) is 20 cm. in length, and 8·5 cm. in greatest breadth; the orifice is 2·5 × 2 cm. in diameter; the walls attain a thickness of 2·5 cm. Two buds and the scar of a third are present on the outer wall.

Beneath the fine, gauze-like dermal layer are seen the round openings of the ostia from ·5 to 2 mm. in diameter.

The diactin marginalia project about 1·8 cm. The root-tuft is about 3·5 cm. in length. A few slender diactin pleuralia project a little above the general velar surface. The gastral membrane, which forms a continuous, finely pilose layer, with a sharply-defined circular rim a little below the edge of the orifice, roofs over the openings of the postica with a fine, sieve-like network, the meshes of which are formed of bundles of diactins covered with autogastral hexactins. In one specimen the lower part of the gastral membrane is cavernous. In all but the smallest specimens the central cavity is deep, but in the latter it only extends to half the length of the sponge body.

The **skeleton** is mainly formed of bundles of diactins with a few large hexactins.

The **spicules. Principalia.** The long diactins mostly smooth, or only very faintly roughened near the ends, usually straight, tapering very gradually to slender, sharp points, a large spicule being 8·25 × ·054 mm. Hexactins of two kinds, either regular with thickly spined rays, each 380 × 10μ (V. 1b), or with the rays nearly smooth, and with the odd pair of rays (each 1500 × 45μ) equal or unequal, and longer than the other four (V. 1a).

The **autodermalia** (V. 1c) are pentactins with or without a distal knob, with all the rays (each 180 × 13μ in length) tapering and wholly spined. Hexactins occur, but rarely.

The **hypodermalia** (V. 1d–d^2) (pleuralia and basalia) are oxypentactins with rough or smooth rays, orthotropal or anorthotropal, the average length of a paratangential being 1660 × 50μ.

The **autogastralia** (V. 1e) are hexactins 266 × 12μ, and closely spined.

The **intermedia** are holoxyhexasters (rare), hemioxyhexasters (V. 1f, f^1), and abundant monoxyhexasters (V. 1f^2, f^3), about 169μ in diameter. The calycocomes (V. 1g, g^1) are 226μ in diameter. The primary rays are only 8μ in length; the capitulum is 14·5μ in length and 22μ in breadth; the secondary rays, 3 to 5 in number, are thick, and either without any terminal knob, or with a very small one.

Fig. 1h, a calycocome, with long primary rays, and without terminal disks, is only 87μ in diameter, and is probably immature.

The discohexasters (V. 1k) are of large size, averaging 110μ in diameter; the primary rays (each 4·5μ in length) terminate in two to four long, disk-tipped secondary rays.

Fig. 1l shows a monodiscohexaster 120μ in diameter.

The microdiscohexasters (V. 1m) are 51μ in diameter; the primary rays, each 7μ in length, terminate in a convex disk-shaped capitulum, from the distal surface of which rays two lengths are given off, the longer rays having larger disks.

Rossella podagrosa differs from *R. antarctica* in that the hypodermal oxypentactins are without prickles; secondly, the basalia resemble the pleuralia, whereas in *R. antarctica* the basalia are anchor-like; further, the calycocomes of the new species have very short primary rays; and lastly, the buds are entirely different in the two species.

Rossella nuda Topsent, has no velum.

Rossella racovitzæ Topsent, is likewise without a velum, and its surface is covered with conules.

Rossella hexactinophila, a new species about to be described, closely resembles *R. podagrosa*, but is distinguished by its hexactin autodermalia, and by the different shape and larger size of the calycocomes; also its oxyhexasters have more slender rays.

All specimens were obtained from Winter Quarters by means of the D-net. (1) No. 104, Hut Point, September 24, 1902, 26 m. (14 fathoms); (2) Nos. 118, 120, Hut Point, November 13, 1902, 46 m. (25 fathoms); (3) No. 137, Flagon Point, January 17, 1903, 18–36 m. (10–20 fathoms); (4) No. 139, January 23, 1903, 18–36 m.; (5) No. 239, 12 hole, 46–55 m. (25–30 fathoms).

Rossella hexactinophila.

(Plate III., fig. 4, and Plate VI., figs. 1a–g.)

Sponge forming an elongated oval flattened sack with a sharp-edged oval orifice provided with marginalia. With a velum; and with a root-tuft about 2 cm. in length mainly composed of oxypentactins resembling those of the velum.

Autodermalia hexactins; oxypentactine hypodermalia with rough or smooth surface and without prickles; oxyhexasters with extremely slender rays.

The single specimen representing the above species is in a bad state of preservation, the five half-macerated fragments of grayish colour being saturated with mud. Mr. Hodgson gives the information that on the return voyage the trawl was put overboard and dragged for some distance over a dead level bottom of mud, but that at one spot the trawl passed over a patch of stones dropped by an iceberg. This would account for the condition of the specimen. With some difficulty the fragments were pieced together in the manner shown on Pl. III., fig. 4; there was no doubt about the base with its small but indubitable root-tuft, nor about the oscular end, but possibly a fragment may be missing from the intervening part; enough remains, however, to show that the sponge was narrow at the orifice and broader at the lower end than above. The specimen, as made up, is 16 cm. in length, and 5 cm. in breadth below the middle. The orifice, which is 1·5 cm. in diameter, is partly surrounded by diactin marginalia projecting about 1·5 cm. The root-tuft is formed of dense tufts of basalia caked with mud at the ends. The velum has been mostly rubbed away; but patches of it exist, especially in the fragment bearing the oscule. The gastral membrane is continuous.

Skeleton.—The framework is formed of bundles of thin slender diactins.

Spicules.—The **principalia** are diactins very long and slender, averaging $3500 \times 1\cdot5\mu$, mostly entirely smooth, and with sharp-pointed ends, though some are slightly roughened at the ends.

The **autodermalia** (VI. 1a) are hexactins, with rather sharp-pointed rays each $154 \times 12\mu$, and spined throughout; the hexactins give a pilose appearance to the surface, especially when viewed under a lens.

The **hypodermalia** are oxypentactins, orthotropal, and mostly with straight smooth rays, each about $900 \times 20\mu$; others are larger, $1000 \times 25\mu$ (VI. 1b, b^1.), with slightly curved wavy rays.

The **autogastralia** (VI, 1c) are hexactins, considerably larger than the autodermalia, each ray being 319μ in length, and $11\cdot25\mu$ in breadth at the base, tapering to a sharp point, and only sparsely spined.

The **intermedia** include holoxyhexasters (VI. 1d), hemioxyhexasters (VI. 1d^1), and only rarely monoxyhexasters (VI. 1d^2), about 110–125μ in diameter; the primary rays are 8–10μ in length; and the secondary rays are extremely slender.

The calcycocomes (VI. 1e), 426μ in diameter, have short primary rays, 13μ in length, continuing each into a long solid capitulum 40μ in length and 16μ in breadth, whence originates a circle of eight to ten finely spined knob-tipped secondary rays.

The holodiscohexasters (VI. 1f, f^1) of medium size, 125μ in diameter, with short primary rays dividing into four or five disk-tipped secondary rays, occur only rarely.

The microdiscohexasters (VI. 1g), 48μ in diameter, have their primary rays,

7μ in length, each ending in a convex disk-shaped capitulum, from which arises a circle of disk-tipped secondary rays in two lengths.

The new species comes very near to *R. podagrosa*, which it closely resembles in general shape, in the characters of the orifice and of the marginalia and basalia, and might perhaps be regarded as a strongly marked variety of that species; but *R. hexactinophila* differs from *R. podagrosa* in having hexactin autodermalia; in having very much larger calycocomes with elongated cylindrical capitula, the capitula in *R. podagrosa* being more or less hemispherical; and in having oxyhexasters with extremely slender secondary rays.

Antarctic Circle, Long. 155° 21′ E., 464 m. (254 fms.).

Rossella racovitzæ.

(Plate I., fig. 5, and Plate IV., figs. 1–7.)

Rossella racovitzæ, Topsent (**11**, p. x., and **12**, p. 33).

The collection contains only one example of this species, which appears, however, to have been common in the region explored by the 'Belgica,' since no less than ten specimens and fragments were obtained in four hauls.

The present specimen is 16 mm. in length and 13 mm. in breadth, not including the pleuralia, which extend 8 mm. from the surface.

The 'Discovery' specimen differs in several respects from those described by Topsent.

The principalia are diactins with roughened rounded ends, sometimes swollen.

The autodermalia are pentactins and stauractins, hexactins being absent; the rays are thick, slightly spined and a little swollen at the ends.

Just below the surface, along with the oxypentactins, are many thick curved diactins $1080 \times 12\mu$.

The oxyhexasters are not remarkable except in the smallness of their numbers; they appear to be replaced by the discohexasters.

The calycocomes are 225μ in diameter, whereas those of the 'Belgica' are 400μ.

The discohexasters, 168μ in diameter, are very abundant; the large disks at the ends of the secondary rays attain a diameter of $16–20\mu$, and have long sharp denticles; these spicules present all the transitions from holodiscohexasters, through hemi- to mono-discohexasters.

The microdiscohexasters (rare), 56μ in diameter, have the secondary rays of only one length.

'Discovery,' Winter Quarters, Flagon Point, January 17, 1903; Dredge 18–36 m. (10–20 fathoms).

The 'Belgica' Expedition dredged it in Lat. 70° 15′–71° 15′ S. Long. 80° 48′–87° 39′ W. 450–569 m. (247–310 fathoms).

Aulorossella.

Sack- or barrel-shaped *Rossellinæ* with three kinds of discohexasters, viz., calycocomes, medium discohexasters and microdiscohexasters. With surface conules.

With hypodermal pentactins with short, thick, smooth paratangentials, associated with conules or bundles of pleuralia; hypodermal pentactins entirely absent from the areas between the conules.

The new genus resembles *Rossella* in possessing three kinds of discohexasters including calycocomes, but differs from it in the character and distribution of the hypodermal pentactins.

In the absence of the hypodermal pentactins from the interconular areas *Aulorossella* approaches *Aulosaccus*, in which these spicules are entirely lacking. In *Scyphidium longispina* Ij. the same spicules are restricted to the upper part of the body, and, in that situation, mostly to the conules; but *Scyphidium* is devoid of the calycocomes, and so also is *Vitrollula* Ij. Possibly when pleuralial bundles are strongly developed, the autodermal surface is less in need of support by means of a layer of hypodermal pentactins, and these latter become restricted to the conules, and their paratangential rays become shortened till they disappear altogether.

In *Aulorossella levis* sp.n. only a very few anchor-like pentactins are present in the bundles of pleuralia prostalia; but these spicules are very abundant in the pleuralial bundles of *A. crassa*, the pentactins being here wholly covered by the dermal membrane. Apropos of the origin of the anchor-like pleuralia and basalia, Schulze observes (**8**, p. 83): "This leads me to suppose that the anchors are to be considered as protruded and enlarged hypodermalia." At first the three species of *Aulorossella* described below were placed under *Aulosaccus*. Prof. Ijima, in his description of *Aulosaccus schulzei* Ij., the type of the genus *Aulosaccus*, expressly states, however (**5**, 112), that no pentactins enter into the composition of the hypodermal skeleton; and, further, only two kinds of discohexasters occur.

Apropos of the presence or absence of hypodermal pentactins, it will not, I think, be out of place to make here a slight correction concerning the species of *Aulosaccus* Ijima (**5**, p. 252 and p. 107), in which genus Prof. Ijima places three species, viz., *A. schulzei* Ijima, *A. ijimai* Schulze, and *A. mitsukurii* Ijima. If Schulze (**7**, pp. 30, 100, and **10**, p. 176) is right in retaining *Calycosaccus* for *C. ijimai* Schulze on account of its markedly pinula-like autodermal and autogastral hexactins with their long obliquely directed spines, then *Aulosaccus* contains only one species, viz., *A. schulzei* Ijima; the species *mitsukurii* belongs, as will be shown below, to *Scyphidium*.

With regard to *Scyphidium mitsukurii* Ijima, the British Museum possesses the specimen referred to by Prof. Ijima (**5**, p. 121) as O.C. No. 4399, and stated by him to be specifically identical with the type of *Scyphidium* (*Aulosaccus*) *mitsukurii*. The specimen is badly preserved, and patches of dermal membrane remain only here and there; but in these patches, and beneath the autodermalia, there are hypodermal pentactins with orthotropal smooth paratangential rays. Prof. Ijima himself says (**5**, p. 109): "If *A. mitsukurii* were only provided with pentactinic hypodermalia I should have no hesitation in referring it to *Scyphidium*." Among the autodermal

stauractins and pentactins are peculiar pentactins with very short, closely-spined paratangential rays and a long, smooth proximal ray; the proximal ray of the ordinary autodermal pentactins is thick and closely spined in its whole length. It is possible that the specimen O.C. 4399 in the British Museum is not specifically identical with the type specimen of *S. mitsukurii* Ij. in Tokyo.

Aulorossella includes three species, all new, collected by the 'Discovery' in the Antarctic Region, viz., *Aulorossella pilosa*, *Aulorossella levis*, *Aulorossella longstaffi*.

Aulorossella pilosa.

(Plate II., fig. 1, and Plate VI. figs. 2–2k.)

Sponge in form of an oval slightly compressed sack, having an oval orifice with thin unarmed margin, the wall provided with large sharp-pointed conuli mostly with long tufts of diactin and, rarely, anchor-like pentactin pleuralia. Gastral cavity deep, and with a continuous finely pilose surface. With a dense, massive root-tuft composed of diactins and anchor-like pentactins.

The intermedia include holoxyhexasters—a form in which each primary ray ends in four or five secondary rays being especially abundant—hemioxyhexasters and, rarely, monoxyhexasters. There are three specimens of this species, all about the same size. The largest is 14 cm. in total height, and 9 × 6 cm. in diameters of the body about the middle; the pleuralia extend 3·5 cm. from the surface. The body-wall attains a thickness of 2 cm., and the conuli a height of 7 mm.

The dermal surface shows a fine lace-like network beneath which are seen the openings of the ostia.

The gastral surface (VI. 2) has a finely pilose appearance when viewed laterally, and feels rough, these characters distinguishing the species from the nearly related *Aulorossella levis*, which has a smooth gastral surface. The surface is finely reticulate, the meshes being ·2 to ·3 mm. in diameter and ·2 mm. in depth; the meshes are formed of strands of hypogastral diactins, bristling with hexactins; about six meshes stretch over each of the postica.

Skeleton. The framework is made up of bundles of diactins; beneath the dermal and gastral surfaces are numerous thick curved isolated diactins roughened at the ends; medium-sized parenchymal hexactins occur only rarely.

Spicules. The **principalia** are diactins varying greatly in length and diameter; they attenuate very gradually to roughened, blunt-pointed ends.

The **autodermalia** (VI. 2b) are pentactins with the rays straight, thickly spined, and diminishing gradually to a thick, blunt end; the paratangential rays are each 131 × 18μ in diameter, and slightly bent downwards towards the odd proximal ray.

The **hypodermalia** are pentactins (VI. 2c) with smooth, slightly curved paratangential rays, each 320 × 40μ, making an angle of 70° to 80° with the shaft; a distal knob or swelling may or may not be present; the odd proximal ray is 2400μ in

length. Sometimes these spicules are found among the diactin pleuralia projecting far beyond the surface, but usually they are situated beneath the autodermal pentactins, either near the surface or concealed amidst bundles of pleuralia.

The anchor-like **basalia** (VI. 2a) have four thick, straight prongs, $560 \times 80\mu$, sharply bent, so as to form an angle of about 35° with the shaft.

The **autogastralia** are completely spined hexactins, each ray being $140 \times 12\mu$.

The **intermedia.** The oxyhexasters vary from 56 to 80μ in diameter; the commonest form is a holoxyhexaster, with principal rays $8–10\mu$, each ending in four straight, sharp-pointed secondary rays (VI. 2d); VI. $2d^1$ shows a variety with curved secondary rays. Hemioxyhexasters in various grades occur, but are not so abundant as the first kind; monoxyhexasters are very rare. Fig. VI. $2d^2$ shows a micro-oxyhexaster $22 \cdot 8\mu$ in diameter, with thick club-like primary rays, each ending in three prickles.

The calycocomes (VI. 2e, e^1) average about 130μ in diameter, the primary rays being trumpet-shaped, slender at their origin, and expanding gradually up to a disk-shaped capitulum; the secondary rays vary in number from three to six. Fig. 2g shows a calycocome with the terminal rays curving in at their extremities. Fig. 2f shows a portion of a larger calycocome, 210μ in diameter, with a cylindrical capitulum partly embraced by the bases of the secondary rays; an axial canal extends about half-way into each capitulum.

Holodiscohexasters (VI. 2h), 94μ in diameter, with short, slender, bifurcated primary rays, occur only rarely.

The microdiscohexasters (VI. 2k) are 34μ in diameter; each primary ray ends in a sharp-pointed, conical capitulum.

Dredged from 183 m. (100 fms.) off Coulman Island.

Aulorossella levis.

(Plate II., figs. 2, 3, and Plate VI., figs. 3–3h.)

Sponge sack-shaped, with an oval orifice with thin unarmed edge. With conules mostly tufted with pleuralia. Root-tuft formed of a compact mass of tufts of basalia. Central cavity deep and spacious. Gastral wall smooth, showing sieve-like groups of openings. Autodermalia pentactins and (rarely) stauractins, autogastralia pentactins, and to a less extent hexactins. Intermedia including, among other kinds, numerous hemioxyhexasters and monoxyhexasters.

There are four specimens of this species, one large one of pale yellow colour (A) in spirit, selected as the type, another (B) much larger, dried, and of dark brown colour, and two small ones (C, D), in spirit.

The dimensions, in centimètres, of specimen A are as follows:—height, 20; root-tuft, 5; diameters in median horizontal plane, 12×10; orifice, $3 \cdot 5 \times 2$; depth of central cavity, 11; thickness of wall, 3; height of cones, 1; length of pleuralia from surface of sponge, 3.

Specimen B is 27 cm. in height and 32·5 cm. in diameter; the colour is now dark brown, but Mr. Hodgson states that it was pale yellow when captured; many of the conules form large, thick, thumb-like projections.

The larger of the two smallest specimens (II. 3) is 3 cm. in height and 2·2 cm. in width, the total height and length, including the pleuralia, being 7 cm. Mr. Hodgson informs me that, on one occasion, he hauled up from 228 m. (125 fms.), No. 6 hole, a huge specimen, apparently of this species, 2 feet in height and 18 inches in diameter, but in spite of desperate efforts to secure it, resulting in his arms becoming like a pincushion, the specimen fell back into the water and was lost.

The dermal surface shows a fine network in which larger and deeper meshes formed by strands of hypodermal diactins are filled in by much finer square meshes formed by the autodermal pentactins.

The gastral membrane (VI. 3) is smooth and shows sieve-like groups of small orifices, which are much larger than those of *A. pilosa.* The membrane is supported by bundles of hypogastral diactins which form a network with large meshes; usually in each mesh there is one large oval orifice, ·5 to 1 mm. in long diameter, with a sharply-defined thin membranous edge. The sieve-like groups of orifices are separated from each other by unperforated areas or zones, which are sometimes of considerable extent in the upper part of the central cavity.

Skeleton. The skeletal framework is constructed of bundles of diactins, and of large regular hexactins, which latter are especially abundant in specimen B.

Spicules. The diactin **principalia** are very long and have their ends either rough or smooth, and sharply pointed (more so than those of *A. pilosa*). The regular hexactins (VI. 3a) have thick rays each $960 \times 90\mu$, smooth or rough at the ends; many of these spicules are abnormal in having their "paratangential" rays curved and bent away from the normal plane like the ribs of an umbrella.

The **pleuralia** are usually diactins; a few anchor pentactins occur in the larger, but many in the smaller specimens.

The **basalia** are pentactins, which attain a length of 10 cm. (VI. 3b), and have very stout prongs, 125μ in thickness at the base.

The **autodermalia** (VI. 3d) are pentactins, with wholly spined rays; each tangential ray, $113 \times 17\mu$, tapers slightly.

The **hypodermal** oxypentactins (VI. c3) are grapnel-like; they are usually found entirely below the surface of the conules, but there are only a few in each conule. Sometimes they project outside among the pleuralia.

The **autogastralia** are chiefly pentactins (VI. 3d^1), each ray being $150 \times 18\mu$ and wholly spined; many hexactins, slightly smaller than the pentactins, also occur; at the nodes of the hypogastral network there is usually a hexactin about twice the size of the autogastral hexactin and with the rays smooth at their bases.

The **intermedia.** Oxyhexasters. Holoxyhexasters are very rare. Hemioxyhexasters (VI. 3e, e^1) are 120μ in diameter, and with almost aborted primary rays.

The monoxyhexasters (VI. $3e^2$) are fairly common; they are about 100μ in diameter. The calycocomes (VI. 3f, f^1) are 220μ in diameter, the primary rays being 14μ in length; the solid hemispherical cup-shaped capitulum is 9μ in length and breadth; the secondary rays form a plume-like circle of six to eight slender, slightly divergent rays, tipped with very small disks.

Holodiscohexasters (VI. 3g), 96μ in diameter, are very rare; the short primary rays, 9μ in length, divide into two to four secondary rays ending in disks with four to five sharp recurved teeth. The microdiscohexasters (VI. 3h) are 40μ in diameter.

This new species closely resembles *A. pilosa* in its outward appearance, but differs from that species chiefly in the structure of the gastral membrane (VI. 3), and in the absence of the holoxyhexasters, so abundant in *A. pilosa.*

Numerous macerated fragments, consisting solely of a skeletal framework of bundles of diactins with large hexactins, and occasionally autodermal pentactins, were obtained from 10–20 fathoms in McMurdo Bay. These, together with a sack-shaped skeleton and a tuft, 20 cm. in length, of diactin and anchor-like pentactin basalia, found by a sledge party on the ice, all belong to *Aulorossella levis.*

Winter Quarters: (1) two large specimens taken in the trawl 150 yards south of the ship, in 18–36 m. (10–20 fms.); (2) two small young specimens from No. 5 hole (Seal Hole), August 7, 1902, 325 m. (178 fms.); (3) Macerated fragments from McMurdo Bay, 18–36 m. (10–20 fms.).

AULOROSSELLA LONGSTAFFI.*

(Plate II., fig. 4, and Plate VII., figs. 1a–k.)

Sponge barrel-shaped, almost solid, with only a very shallow gastral cavity with wide circular orifice having a thin unarmed edge. Surface irregularly tuberculated and ridged, pleuralia almost entirely absent (there being only two or three scattered about). Inferior end without a definite root-tuft, but with a few large conules with a few basalia. Autodermalia thick pentactins, autogastralia thick hexactins. Amongst the parenchymalia curious tetractins.

The sole specimen of this interesting species is 6·8 cm. in height, 3·9 cm. in breadth about the middle; the orifice is nearly 2 cm. in diameter, and the gastral cavity only 1·4 cm. in depth. In its stumpy fleshy appearance, the specimen somewhat resembles a kind of cactus plant. Both the dermal and gastral surfaces are smooth and glistening, and almost opaque, scarcely showing any trace of a hypogastral network. The shallow gastral cavity has in its floor two depressions separated by a ridge.

The **skeleton** is mainly constructed of bundles of diactins; and in addition to these, large regular hexactins are distributed in the sponge body.

* The species name is given in honour of Mr. Longstaff, whose munificent donation of £25,000 made possible the fitting-out of the expedition.

Spicules. The **principalia** are diactins varying in length and thickness, but sometimes very thick and strongly tuberculated at the ends (VII. 1a). Large regular hexactins, with rays spined at the ends, also occur. Among the principalia must be reckoned the remarkable pyramidal tetractins (VII. 1b, b^1) with usually equal rays varying in length in different spicules from 320–1000μ, spined only at the ends. Sometimes below the point of junction of the rays there is an enlargement, apparently an aborted fifth ray. Some of the hypodermal pentactins resemble the tetractins in having their four paratangential rays pyramidal.

A few anchor-like pentactin pleuralia with straight prongs making an acute angle with the shaft are present.

Only diactins are visible in the few short broken tufts of basalia, but possibly some of the spicules with broken ends may be pentactins.

The **autodermalia** (VII. c.) are thick, closely-spined pentactins with rays each $169 \times 24 \cdot 5\mu$.

The pentactin **hypodermalia** are found beneath the tubercles and conules; they vary considerably in shape; in some (VII. $1d^1$) the paratangential rays make an angle of 70° to 90°, others (VII. 1d, d^2, d^3) an angle of 30° to 45° with the shaft; they may be wholly smooth, but are usually spined at the ends of the prongs.

No less than eighteen of these spicules were found beneath the surface of one conule.

The **autogastralia** (VII. 1e) are hexactins with closely spined rays, each ray being $118 \times 15 \cdot 5\mu$.

The **intermedia.** Oxyhexasters (VII. 1f, f^1, f^2) of the three kinds (holo-, hemi- and monoxyhexasters) occur, the first and last kind being rare. The diameter is about 115μ. The calycocomes (VII. 1g, g^1), 230μ in diameter, have slender primary rays $8 \cdot 3\mu$ in length, and the solid capitulum 12μ in length and $8 \cdot 5\mu$ in breadth. The terminal rays, four to seven in number, are roughened and tipped each with a small disk. Each ray has an oval swelling (VII. $1g^1$) near its origin and on the inner aspect, at alternately higher and lower levels. Discohexasters are rare. Fig. 1h shows a monodiscohexaster 55μ in diameter. The axial canals extend only to the end of the basal thickened part (primary portion) of each ray. The microdiscohexasters (VII. 1k) are 40μ in diameter, the primary rays being $7 \cdot 5\mu$ in length.

W.Q., June 3, 1903. No. 10 Hole. 238 m. (130 fms.).

Anaulosoma.*

Rossellinæ without a central cavity, but with the gastral surface flat and exposed at the superior end of the sponge. Without hypodermal pentactins. With oxyhexasters, calycocomes, discohexasters, and microdiscohexasters. The new genus resembles *Bolosoma*, *Caulophacus*, and *Aulochone* in having an exposed gastral surface. Among the *Rossellinæ*, *Anaulosoma* agrees with *Aulochone* and *Aulosoccus* in being

* ἀ, privative; αὐλή, hall; σῶμα, body.

without hypodermal pentactins. *Aulochone*, which has an everted gastral surface, differs from the new genus in being stalked, and in possessing only one kind of discohexaster.*

Anaulosoma schulzii.

(Plate III., figs. 5, 6, and Plate V., fig. 2 a–m).

Sponge shaped somewhat like a molar tooth, with rounded or carinated mammillæ at the lower end, and with a free gastral surface at the upper end. Surface smooth, without pleuralia, with a few diactin marginalia at the junction of the dermal and gastral surfaces. With a few very small tufts of diactin basalia extending downwards from the mammillæ. Principalia, bundles of diactins, also hexactins, pentactins, stauractins, and tauactins. Autodermalia, pentactins; hypodermalia diactins in bundles forming a network. Autogastralia, pentactins, with a few hexactins.

There are two specimens (A, C) and two fragments (B, D) of this sponge. Specimen A (III., 5), the type, from McMurdo Bay, is 6·5 cm. in height, 4·5 cm. in width, and 3·3 cm. in thickness. The texture of the sponge is loose. The thin felt-like gastral surface, with several thin-edged exhalant orifices, is easily distinguishable from the lace-like dermal surface, the two being separated by a sharp edge. The oval gastral surface, 5 × 3 cm., which occupies the whole upper end of the sponge, slopes downwards a little; the largest of the "oscules" is oval, and 1 × ·5 cm. in diameter; the walls of the large canal into which it leads are lined simply with scattered canalaria in the form of oxyhexasters. The autogastralia are pentactins, and rarely hexactins. Two or three deeply curved diactins are present on or near the gastral margin, but it is doubtful whether they are really marginalia, or, indeed, whether they belong to the specimen at all. The lower end of the sponge is prolonged into two rounded extensions, each with a small tuft of basalia.

The small specimen C (III. 6) is somewhat wedge-shaped, the inferior end narrowing to a ridge, with a small tuft of basalia projecting obliquely downwards and outwards from only one of the ends of the ridge. The upper end, or gastral surface, 1·1 cm. in diameter, is in the form of a small circular area, with one small circular orifice (1·5 mm. in diameter) of an exhalant canal. Round the margin is a circle of small diactin marginalia projecting about 6 mm. The two fragments (B, D) are the lower halves of broken specimens; in them the broken surface shows the openings of numerous canals passing vertically upwards from the base.

In *Anaulosoma schulzii* there is a marked difference in the appearance of the dermal and gastral surfaces, the former showing a fine lace-like reticulum perceptible to the naked eye, while the latter has an opaque, felt-like appearance. This difference is chiefly due to the arrangement of the hypodermal skeleton. In the dermal region

* I have recently found microdiscohexasters in *Aulochone* (*Crateromorpha*) *lankesteri* Kirkp. from South Africa. These spicules escaped my notice when I first described the sponge (Ann. Mag. N.H. (7) VII., 1901, p. 457).

there is the extremely fine square-meshed reticulum formed by the tangential rays of the autodermal pentactins. Beneath this are subdermal spaces separated by the proximal rays of the pentactins from the hypodermal network with its much larger triangular or trapezoidal meshes. The strands of the hypodermal network are formed of straight tangentially arranged bundles of rather thick diactins. The gastral region, on the other hand, is without subgastral network and spaces, and the bundles of diactin principalia are not distinguishable from those of the rest of the parenchyma.

Canal-System and Soft Tissues.—The main exhalant canals run vertically upwards from base to summit, receiving lateral branches in their course. A section shows circles of the flagellated chambers opening into the finer canals. The subdermal trabecular network, and the lining of many of the exhalant canals, are crowded with masses of knollen-thesocytes, each thesocyte being about 8–10μ in diameter. In unstained balsam preparations these masses of thesocytes are clearly distinguished by their dark yellow colour; further, they take a deeper stain with borax carmine than do the rest of the sponge tissues.

The **skeleton** is formed mainly of bundles of diactins and of separate large hexactins, pentactins, stauractins, and tauactins.

Spicules.—The **principalia** are diactins which vary considerably in length and thickness, the average kind being about 7560 × 22μ, tapering to fine points and spined at the extremities. The spicules, which, in specimen A, are regarded as possible marginalia, are in the form of two or three long curved diactins about 5 cm. in length. They have become misplaced, and possibly may not belong to the sponge. The delicate marginalia in specimen C project about 6 mm., and are about 13 mm. in length.

The little tufts of diactin basalia are about 2·5 cm. in length.

The large regular hexactins (V. 2a) have rays 800 × 60μ, slightly spined at the ends; large pentactins, stauractins, and tauactins (V. 2b, c, d) also are present.

The **autodermalia** (V. 2e) are pentactins with rays 172 × 24·5μ, closely spined. Young pentactins with fine, smooth, sharp rays occur both in the dermal and gastral layers.

The **autogastralia** are mostly pentactins similar to the autodermalia; a few small regular hexactins also occur, especially in specimen C. Plate V., figs. 2f–2f^4, shows several modified hexactins and a pentactin from the region round the single exhalant orifice in specimen C.

The **intermedia**. Oxyhexasters. Holoxyhexasters (V. 2g), 197μ, with bifurcate primary rays, short or almost absent, are not uncommon; a kind (V. 2g^1), 86μ, in which each primary ray ends in a disk, whence five to six sharp-pointed secondary rays diverge, occurs less frequently.

Hemioxyhexasters (V. 2g^2), about 180μ, are abundant; and monoxyhexasters (V. 2g^3), also about 180μ in diameter, occur, but rarely; fig. 2g^2 shows a hemioxyhexaster in which one of the secondary rays has a trifid termination. (The small "2" of 2g^2 has been omitted in the plate.)

The calycocomes (V. 2h, h^1) are, on an average, about 225μ in diameter, the primary rays being 9μ in length; each capitulum, 6·75μ in length and 14·5μ in breadth, ends in two to four roughened secondary rays tipped with button-like disks.

Hemidiscohexasters (V. 2k, k^1), 100μ in diameter, occur but rarely; the primary rays end in one to three secondary rays tipped with disks having four to six long recurved teeth. Fig. 2l shows an exceptional form, 91μ in diameter, with thick primary and secondary rays, the latter again dividing into two or three short branches.

The microdiscohexasters (V. 2m) are 43μ in diameter, with primary rays 5·5μ in length, and with a convex capitulum, whence about six disk-tipped secondary rays arise.

Winter Quarters: (1) one specimen (A), the type, and a fragment (B), February 28, 1902, McMurdo Bay, 36 m. (20 fms.); (2) a small specimen (C), No. 4 hole, January 30, 1902, 75 m. (41 fms.); (3) a fragment (D), No. 12 hole, September 8, 1903, 45–55 m. (25–30 fms.).

Sub-Family Lanuginellinæ.

Anoxycalyx.

Lanuginellinæ without Oxyhexasters, with Graphiocomes.

Anoxycalyx ijimai.

(Plate III., fig. 7, and Plate VII., figs. 2–$2g^1$.)

Sponge in form of a small compressed pyriform sack, with the surface studded with small conules and small flattened pyriform buds. With slender tufts of long fine diactin pleuralia and basalia. The orifice narrow and oval, with a plain rim, and without marginalia. Autodermalia stauractins (mainly) and pentactins, with the odd ray proximal, more rarely tauactins and angular diactins; hypodermal pentactins confined to the conules; autogastralia hexactins, with large microdiscohexasters, with graphiocomes, and very large strobilocomes.

The largest of the three small specimens is 2·2 cm. in the length of the body, and 7·5 cm. in total length, *i.e.*, including the pleuralia; the greatest width is 1·7 cm. and the thickness 7 mm.; the slit-like orifice is 4 mm. in width. The largest buds attain a length of 2 mm.

The **skeleton** is mainly formed of bundles of diactins.

Spicules. The diactin **principalia** of the bundles are very slender, wavy, tapering to fine points, and roughened at the ends; a much thicker kind are isolated, or with slender comitalia. Pl. VII., fig. 2a, shows a parenchymal triactin × 150. The slender wavy pleuralia attain a length of 5 cm.

The **autodermalia** are chiefly stauractins (VII. 2b), with each ray 234 × 12μ, slightly spined, curved inwards, rounded at the end; occasionally these spicules have thick club-like rays (VII. $2b^4$).

The autodermal pentactins (VII. $2b^1$) are fairly numerous; the odd proximal ray is spined. Fig. $2b^2$ shows a tauactin. The rays of the curious angular diactins (VII., $2b^3$) form an angle of 60°.

The **hypodermalia** are pentactins (VII. 2c) with long, deeply-curved paratangential rays $1240 \times 55\mu$, tapering to a sharp point. In one or two instances these spicules project out a small distance, and might be regarded as basalia.

The **autogastralia** (VII. 2d) are hexactins with slender, sparsely-spined cylindrical rays, each $188 \times 5 \cdot 6\mu$.

Intermedia. The strobilocomes (VII. 2f, f^1) are 175μ in diameter; each primary ray ($13 \cdot 5\mu$ in length) ends in a cone or strobilus rounded at the distal end, and giving off a series of four verticils of long slender S-shaped rays, each tipped with a toothed disk; the verticils increase in length from below upwards, the lowest and outermost being the shortest, and the highest and innermost the longest. The plumes of the secondary rays are more loosely tufted than is the case in most other species, where the rays of the verticils and the verticils themselves are more closely packed.

The graphiocomes (VII. 2e, e^1) are 150μ in diameter; each primary ray is $7 \cdot 25\mu$ in length and ends in a broad disk, from the whole distal convex surface of which a diverging tuft of fine raphide-like rays is given off.

The microdiscohexasters (VII. 2g, g^1) are of large size, being 60μ in diameter; the primary rays end in a circle of disk-tipped secondary rays surrounding a central cone continued into a ray ending in a disk.

The new genus is near to *Lophocalyx*, but differs from it and from other genera of *Lanuginellinæ* in having no oxyhexasters.

Pl. VII., fig. 2, shows a thin section of one of the largest buds, which has an oscule and central cavity.

The section has been made in a direction slightly oblique to the long axis, and shows the convex outer ends of the flagellated chambers; although several of these outer ends have been cut through, the artist has put them in, the figure being a combination one, and, I fear, slightly diagrammatic.

W.Q., January 2, 1904. No. 14 Hole. 329m. (180 fms.).

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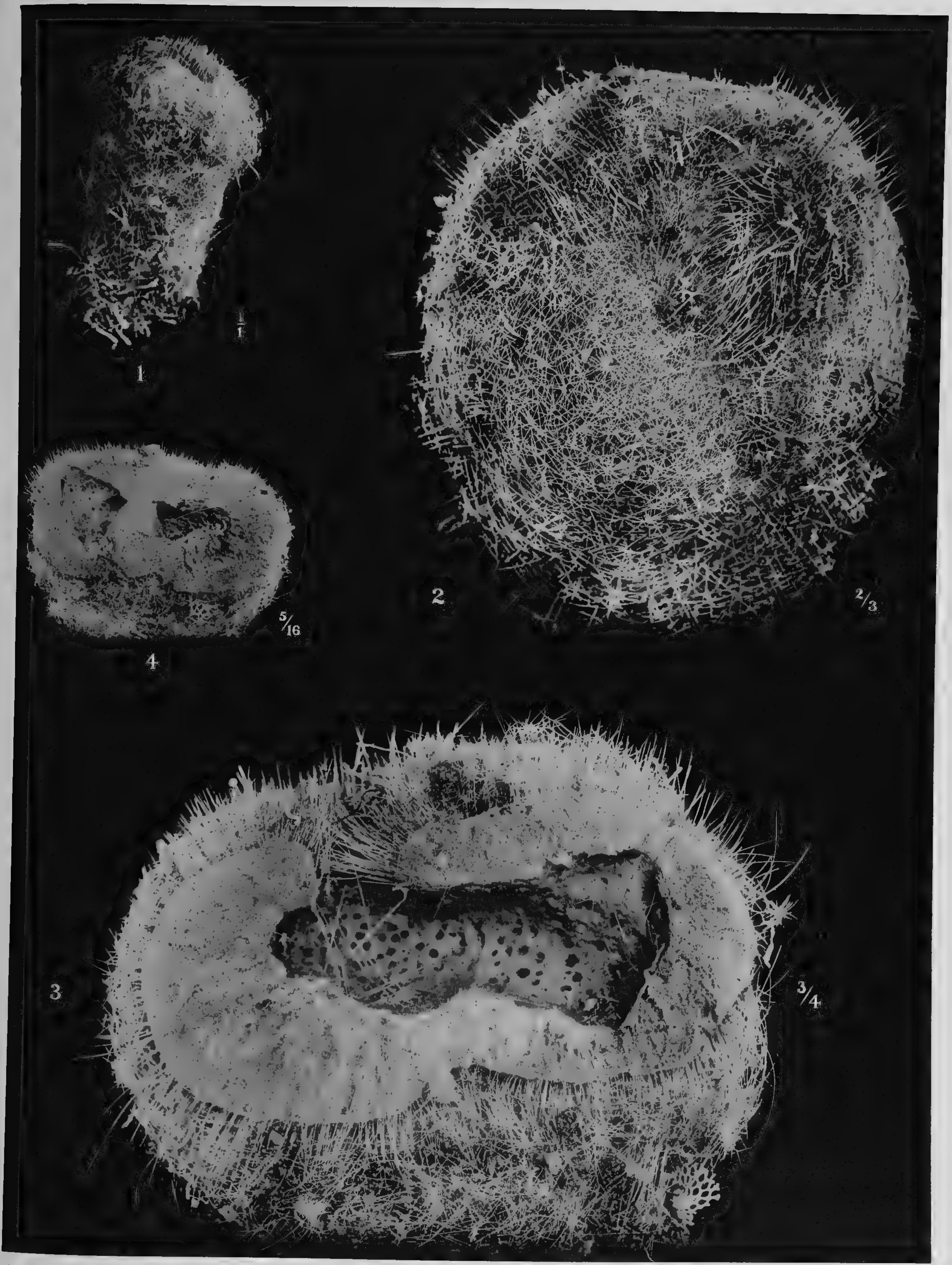
PLATE I.

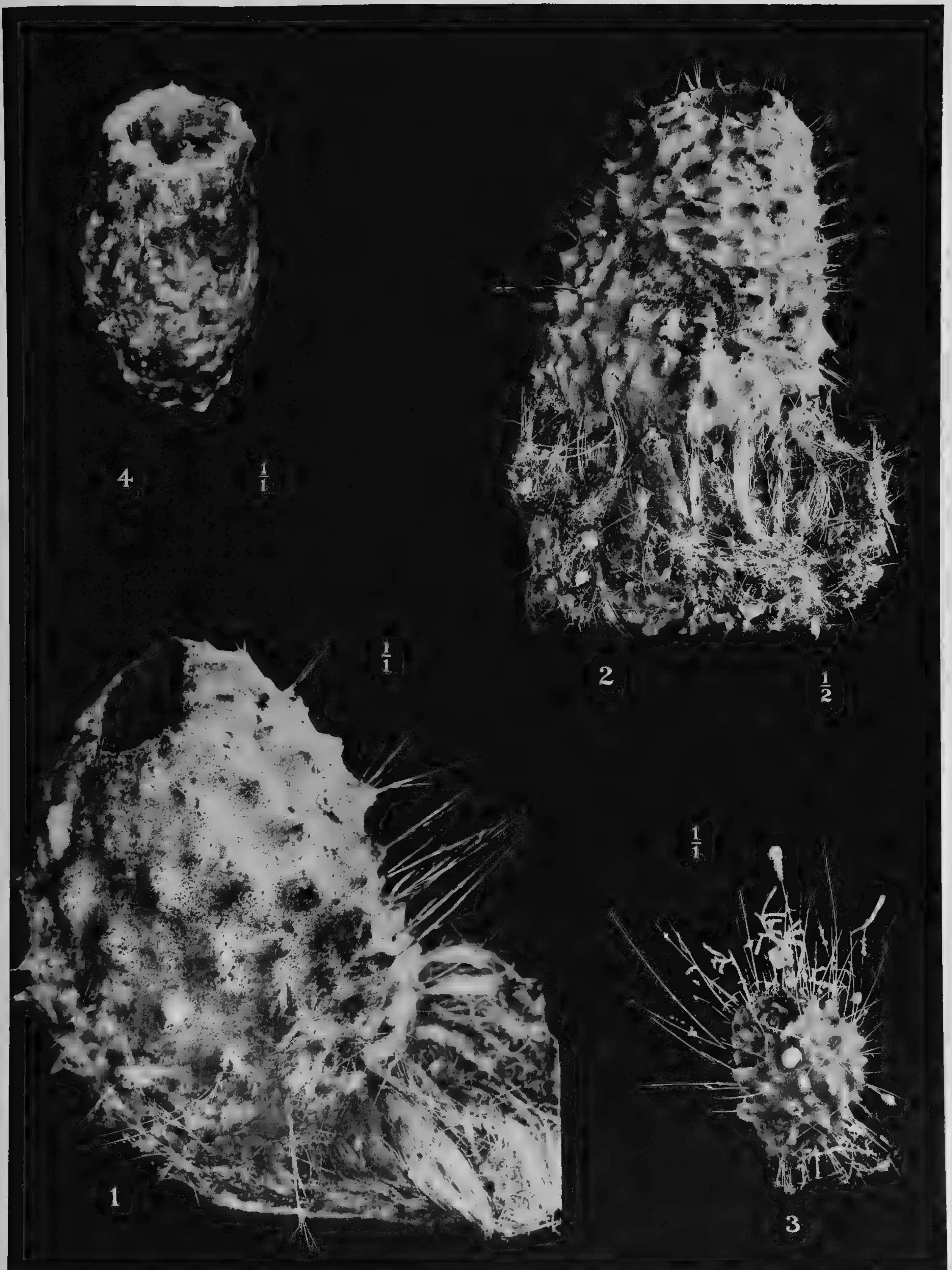
FIG. 1.—*Rossella antarctica* Carter, Specimen A. Nat. size. (Page 5.)
FIG. 2.—*Rossella antarctica*, Specimen B. $\frac{2}{3}$ nat. size. (Page 7.)
FIG. 3.—*Rossella antarctica*, Specimen C, vertical section. $\frac{3}{4}$ nat. size. (Page 8.)
FIG. 4.—*Rossella antarctica*, Specimen C, vertical section showing the other half. $\frac{5}{16}$ nat. size.



Antarctic (Discovery) Exp. Sponges Pl. 1 Highley Phot. Macbeth Imp

PLATE II.

FIG. 1.—*Aulorossella pilosa*. Nat. size. (Page 16.)
FIG. 2.—*Aulorossella levis*. $\frac{1}{2}$ nat. size. (Page 17.)
FIG. 3.—*Aulorossella levis*, a young specimen. Nat. size.
FIG. 4.—*Aulorossella longstaffi*. Nat. size. (Page 19.)



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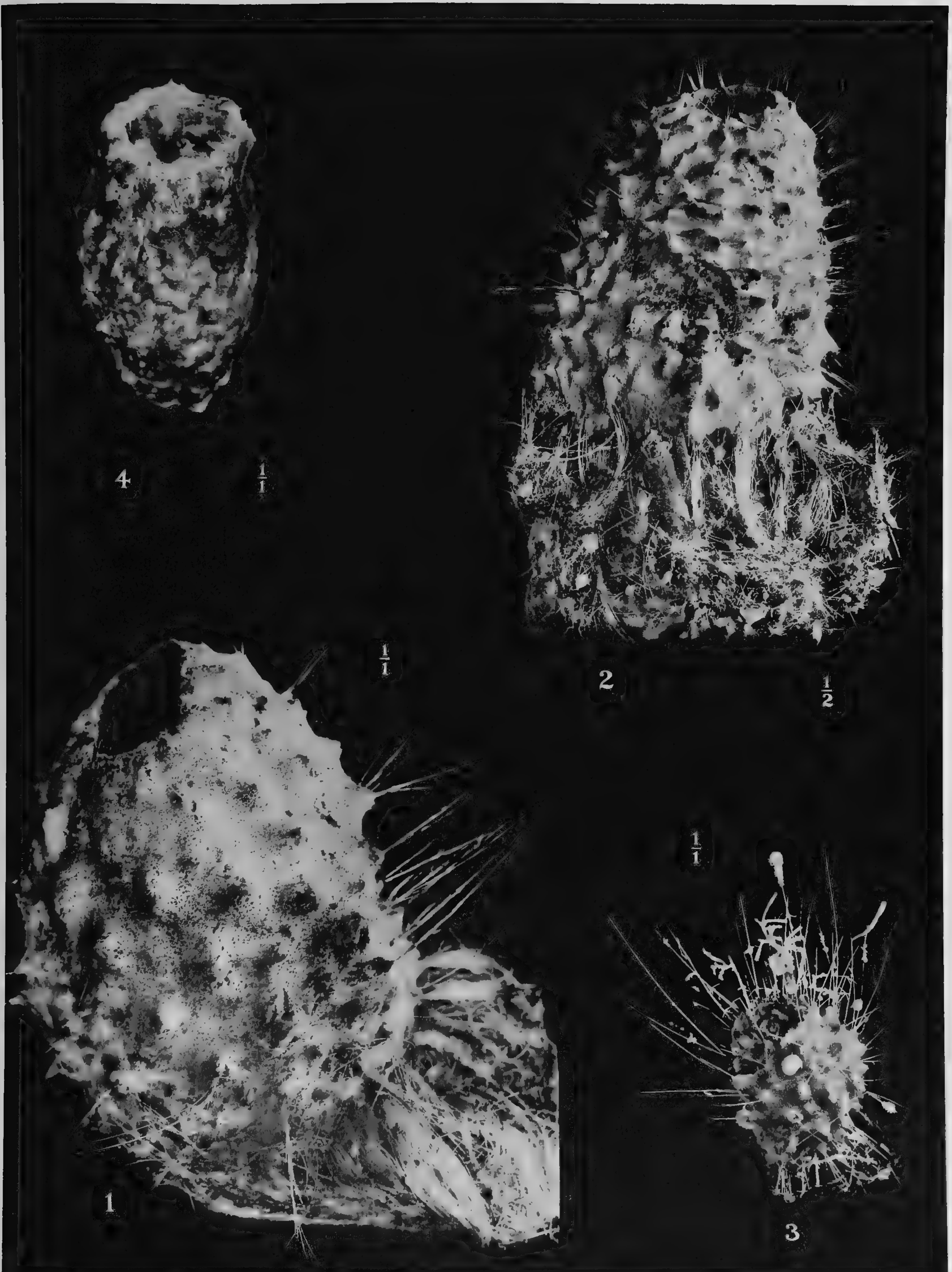

 Sponges Pl. 2 Highley Phot. Macbeth Imp

PLATE III.

FIG. 1.—*Hyalascus hodgsoni.* $\frac{2}{3}$ nat. size. (Page 3.)
FIG. 2.—*Rossella podagrosa.* $\frac{1}{2}$ nat. size. (Page 11.)
FIG. 3.—*Rossella podagrosa*, another specimen. $\frac{2}{3}$ nat. size.
FIG. 4.—*Rossella hexactinophila.* $\frac{2}{3}$ nat. size. (Page 12.)
FIG. 5.—*Anaulosoma schulzii.* Nat. size. (Page 21.)
FIG. 6.—*Anaulosoma schulzii*, another specimen. Nat. size.
FIG. 7.—*Anoxycalyx ijimai.* Nat. size. (Page 23.)


1/1
5
2/3
1
2/3
3
2
4
1/1
2/3
7
1/2
1/1
6

PLATE IV.

FIG. 1*a–g*.—*Hyalascus hodgsoni*. Spicules. (Page 4.)
FIG. 1*a*.—Autodermal hexactin. (× 160.)
FIG. 1*b*.—Autodermal pentactin. (× 160.)
FIG. 1*c*, c^1, c^2.—Modified autodermalia. (× 160.)
FIG. 1*d*, 1d^1.—Hypodermal oxypentactins. (× 50.)
FIG. 1d^2.—Autogastral hexactin. (× 160.)
FIG. 1*e*.—Holoxyhexaster. (× 240.)
FIG. 1e^1.—Hemioxyhexaster. (× 240.)
FIG. 1e^2.—Monoxyhexaster. (× 240.)
FIG. 1*f*.—Holodiscohexaster. (× 240.)
FIG. 1f^1.—The same (part). (× 700.)
FIG. 1*g*.—Microdiscohexaster. (Optic. sect.) (× 700.)

FIG. 2*a–g*.—*Rossella antarctica* Carter. Spicules of Specimen A. (Page 6.)
FIG. 2*a*.—Parenchymal regular hexactin. (× 160.)
FIG. 2*b*.—Autodermal pentactin. (× 160.)
FIG. 2b^1.—Autodermal hexactin. (× 160.)
FIG. 2b^2.—Autodermal stauractin. (× 160.)
FIG. 2*c*.—Autogastral hexactin. (× 160.)
FIG. 2*d*, 2d^1.—Holoxyhexasters. (2d^1 in optic. sect.) (× 160.)
FIG. 2d^2.—Hemioxyhexaster. (× 160.)
FIG. 2d^3.—Monoxyhexaster. (× 160.)
FIG. 2d^4.—Central part of 2d^3, showing termination of axial canals. (× 700.)
FIG. 2*e*.—Hemidiscohexaster (modified). (× 700.)
FIG. 2*f*.—Calycocome. (Optic. sect.) (× 700.)
FIG. 2*g*.—Portion of another calycocome with shorter smooth shaft and divergent rays. (× 700.)
FIG. 2*h*.—Microdiscohexaster. (Optic. sect.) (× 700.)

FIG. 3*a–k*.—*Rossella antarctica*. Spicules of Specimen C, only 3*h* being from Specimen B. (Page 8.)
FIG. 3*a*, 3a^1.—Oxypentactin basalia. (× 50.)
FIG. 3*b*.—Autodermal pentactin. (× 160.)
FIG. 3*c*.—Autogastral hexactin. (× 160.)
FIG. 3c^1.—Autogastral pentactin, a kind only found in Specimen C. (× 160.)
FIG. 3*d*.—Holoxyhexaster. (Optic. sect.) (× 240.)
FIG. 3d^1, 3d^2.—Hemioxyhexasters. (× 240.)
FIG. 3d^3, 3d^4.—Monoxyhexasters. (× 240.)
FIG. 3d^5.—Stauractin-like monoxyhexaster. (× 240.)
FIG. 3d^6.—Three spheroidal reduced oxyhexasters. (× 240.)
FIG. 3*e*.—Seven discohexasters, showing variation in form. (× 240.)
FIG. 3e^1.—Hemidiscohexaster. (× 700.)
FIG. 3*f*.—Calycocome. (Optic. sect.) (× 240.)
FIG. 3f^1.—The same (a part). (× 700.)
FIG. 3*g*.—Part of another calycocome. (× 700.)
FIG. 3*h*.—Abnormal calycocome, from Specimen B. (× 700.)
FIG. 3*k*.—Microdiscohexaster. (Optic. sect.) (× 700.)
FIG. 3*l*.—Portion of a variety of microdiscohexaster. (× 700.)

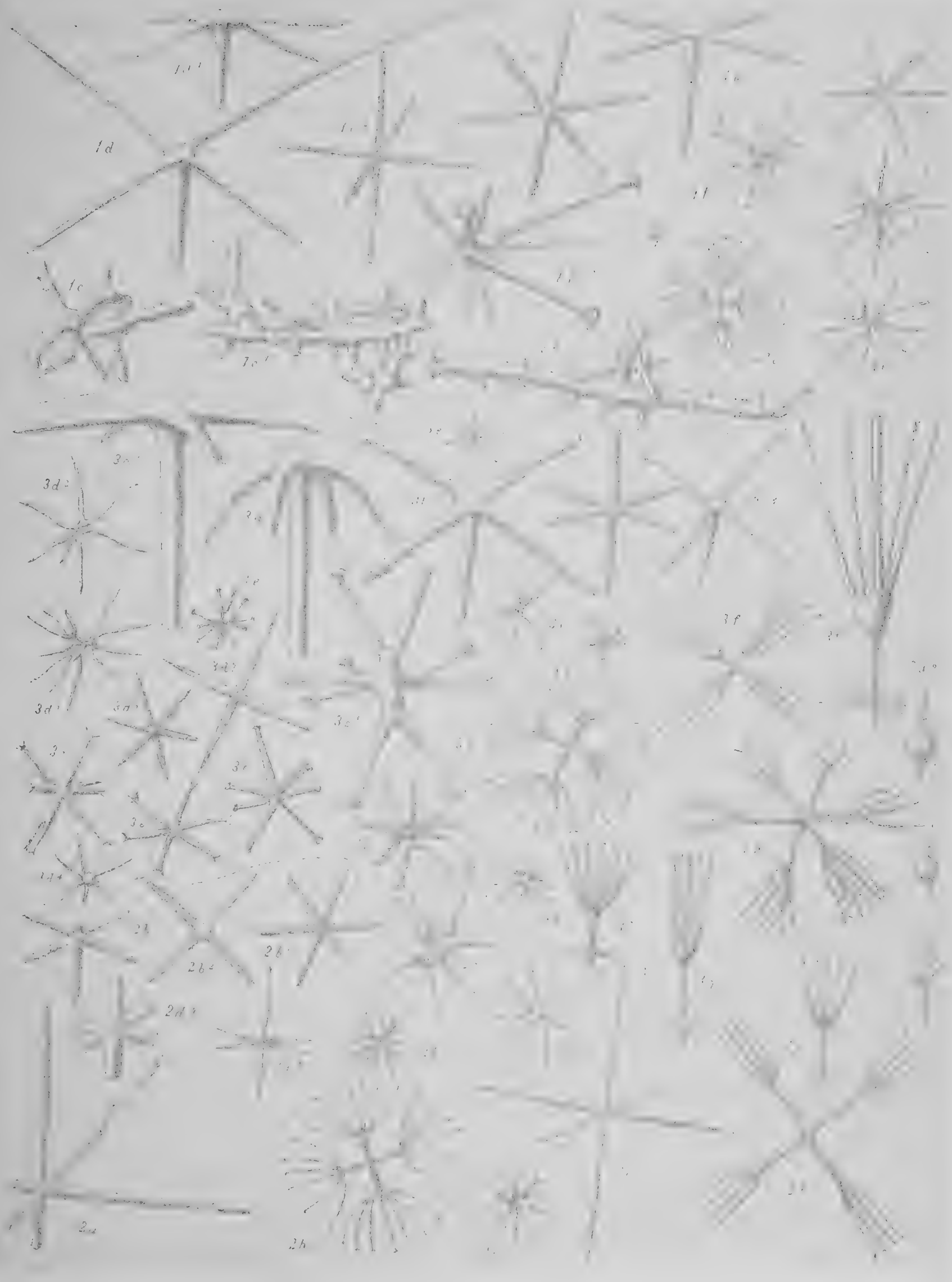

PLATE V.

FIG. 1*a–m*.—*Rossella podagrosa*. Spicules. (Page 11.)
FIG. 1*a*.—Parenchymal hexactin. (× 50.)
FIG. 1*b*.—Parenchymal hexactin. (× 50.)
FIG. 1*c*.—Autodermal pentactin. (× 160).
FIG. 1*d*, 1d^1, 1d^2.—Hypodermal oxypentactins. (× 50.)
FIG. 1*e*.—Autogastral hexactin. (× 160.)
FIG. 1*f*, 1f^1.—Hemioxyhexasters. (× 160.)
FIG. 1f^2, 1f^3.—Monoxyhexasters. (× 160.)
FIG. 1f^4.—Small monoxyhexaster. (× 160.)
FIG. 1*g*.—Calycocome. (Optic. sect.) (× 240.)
FIG. 1g^1.—The same. (× 700.)
FIG. 1*h*.—Small calycocome, without disks. (× 240.)
FIG. 1*k*.—Holodiscohexaster. (× 240.)
FIG. 1*l*.—Monodiscohexaster. (× 240.)
FIG. 1*m*.—Microdiscohexaster. (Optic. sect.) (× 700.)

FIG. 2*a–m*.—*Anaulosoma schulzii*. Spicules. (Page 22.)
FIG. 2*a*.—Parenchymal hexactin. (× 50.)
FIG. 2*b*.—Parenchymal pentactin. (× 50.)
FIG. 2*c*.—Parenchymal stauractin. (× 50.)
FIG. 2*d*.—Parenchymal tauactin. (× 50.)
FIG. 2*e*.—Autodermal pentactin. (× 160.)
FIG. 2*f*–2f^4.—Modified (Autogastral ?) hexactins, and pentactin, all from Specimen C. (× 160.)
FIG. 2*g*, 2g^1, 2g^2, 2g^3.—Holo-, Hemi-, and Mon-oxyhexasters. (The small "2" of 2g^2 is not visible on the plate.) (× 160.)
FIG. 2*h*.— Calycocome. (Optic. sect.) (× 240.)
FIG. 2h^1.—Part of same. (× 700.)
FIG. 2*k*.—Hemidiscohexaster. (× 240.)
FIG. 2k^1.—Part of the same. (× 700.)
FIG. 2*l*.—Curious discohexaster, with three orders of rays. (× 700.)
FIG. 2*m*.—Microdiscohexaster. (Optic. sect.) (× 700.)

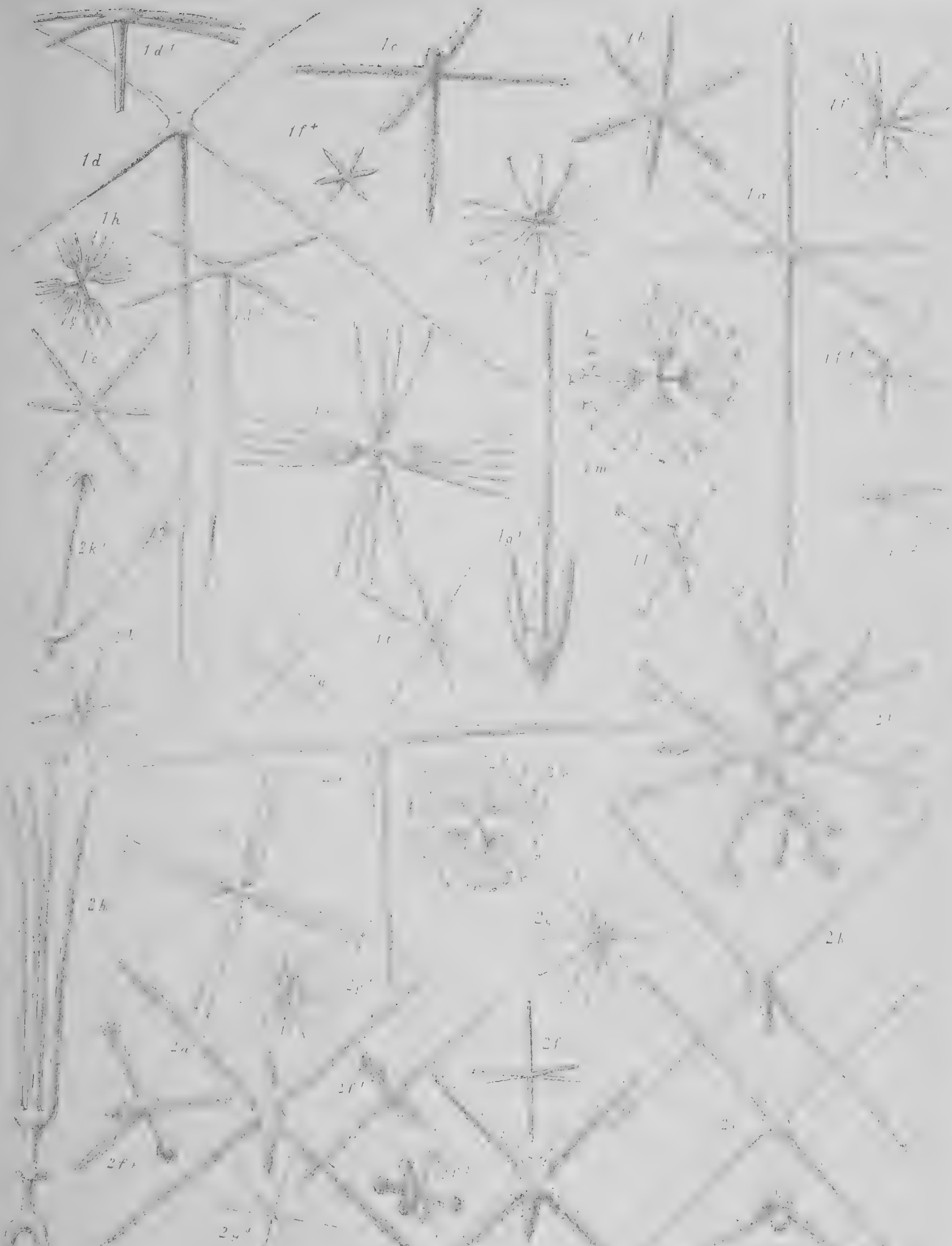
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PLATE VI.

FIG. 1*a–g*.—*Rossella hexactinophila*. Spicules. (Page 13.)
FIG. 1*a*.—Autodermal hexactin. (× 160.)
FIG. 1*b*, *b*[1].—Hypodermal oxypentactins. (× 50.)
FIG. 1*c*.—Autogastral hexactin. (× 160.)
FIG. 1*d*.—Holoxyhexaster. (× 240.)
FIG. 1*d*[1].—Hemioxyhexaster. (× 240.)
FIG. 1*d*[2].—Monoxyhexaster. (× 240.)
FIG. 1*e*.—Calycocome. (Optic. sect.) (× 160.)
FIG. 1*f*.—Holodiscohexaster. (Optic. sect.) (× 240.)
FIG. 1*f*[1].—The same, one secondary ray. (× 700.)
FIG. 1*g*.—Microdiscohexaster. (Optic. sect.) (× 700.)

FIG. 2–2*k*.—*Aulorossella pilosa*. (Page 16.)
FIG. 2.—Gastral membrane. (× 10.)
FIG. 2*a*.—Basalial oxypentactin. (× 50.)
FIG. 2*b*.—Autodermal pentactin. (× 160.)
FIG. 2*c*.—Hypodermal pentactin. (× 50.)
FIG. 2*d*.—Holoxyhexaster. (Optic. sect.) (× 240.)
FIG. 2*d*[1].—Holoxyhexaster, a variety. (Optic. sect.) (× 425.)
FIG. 2*d*[2].—Dwarf holoxyhexaster. (× 700.)
FIG. 2*e*.—Calycocome. (Optic. sect.) (× 240.)
FIG. 2*e*[1].—Portion of 2*e*. (× 700.)
FIG. 2*f*.—Portion of calycocome from another specimen. (× 700.)
FIG. 2*g*.—Ditto, with incurved secondary rays. (× 700.)
FIG. 2*h*.—Holodiscohexaster. (× 160.)
FIG. 2*k*.—Microdiscohexaster. (Optic. sect.) (× 700.)

FIG. 3–3*h*.—*Aulorossella levis*. (Page 18.)
FIG. 3.—Gastral membrane. (× 10.)
FIG. 3*a*.—Parenchymal hexactin. (× 50.)
FIG. 3*b*.—Basalial oxypentactin. (× 50.)
FIG. 3*c*.—Hypodermal oxypentactin. (× 50.)
FIG. 3*d*.—Autodermal pentactin. (× 160.)
FIG. 3*d*[1].—Autogastral pentactin. (× 160.)
FIG. 3*e*, 3*e*[1].—Hemioxyhexasters. (× 240.)
FIG. 3*e*[2].—Monoxyhexaster. (× 240.)
FIG. 3*f*.—Calycocome. (Optic. sect.) (× 240.)
FIG. 3*f*[1].—Ditto, part. (× 700.)
FIG. 3*g*.—Holodiscohexaster. (Optic. sect.) (× 240.)
FIG. 3*h*.—Microdiscohexaster. (Optic. sect.) (× 700.)

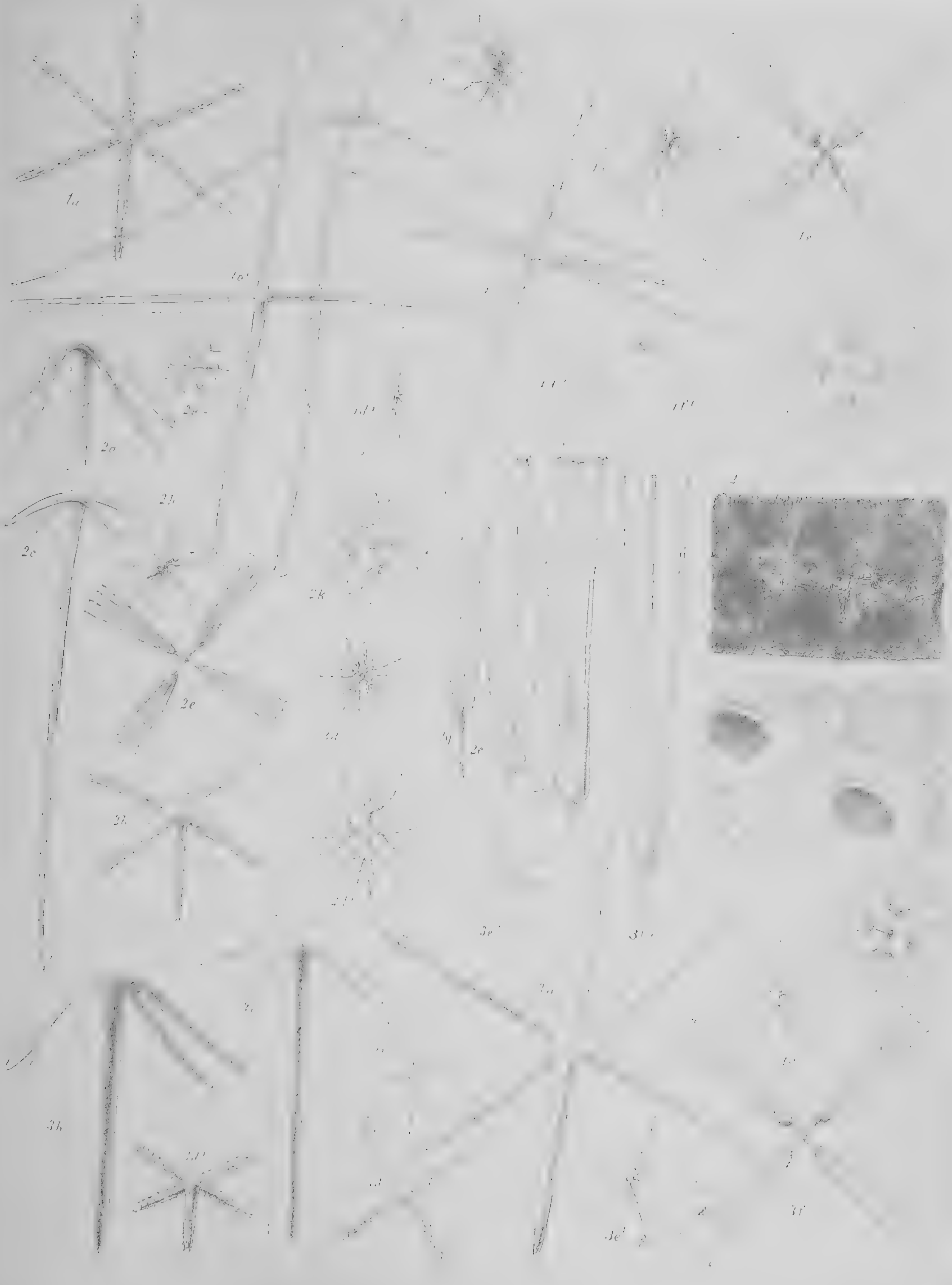

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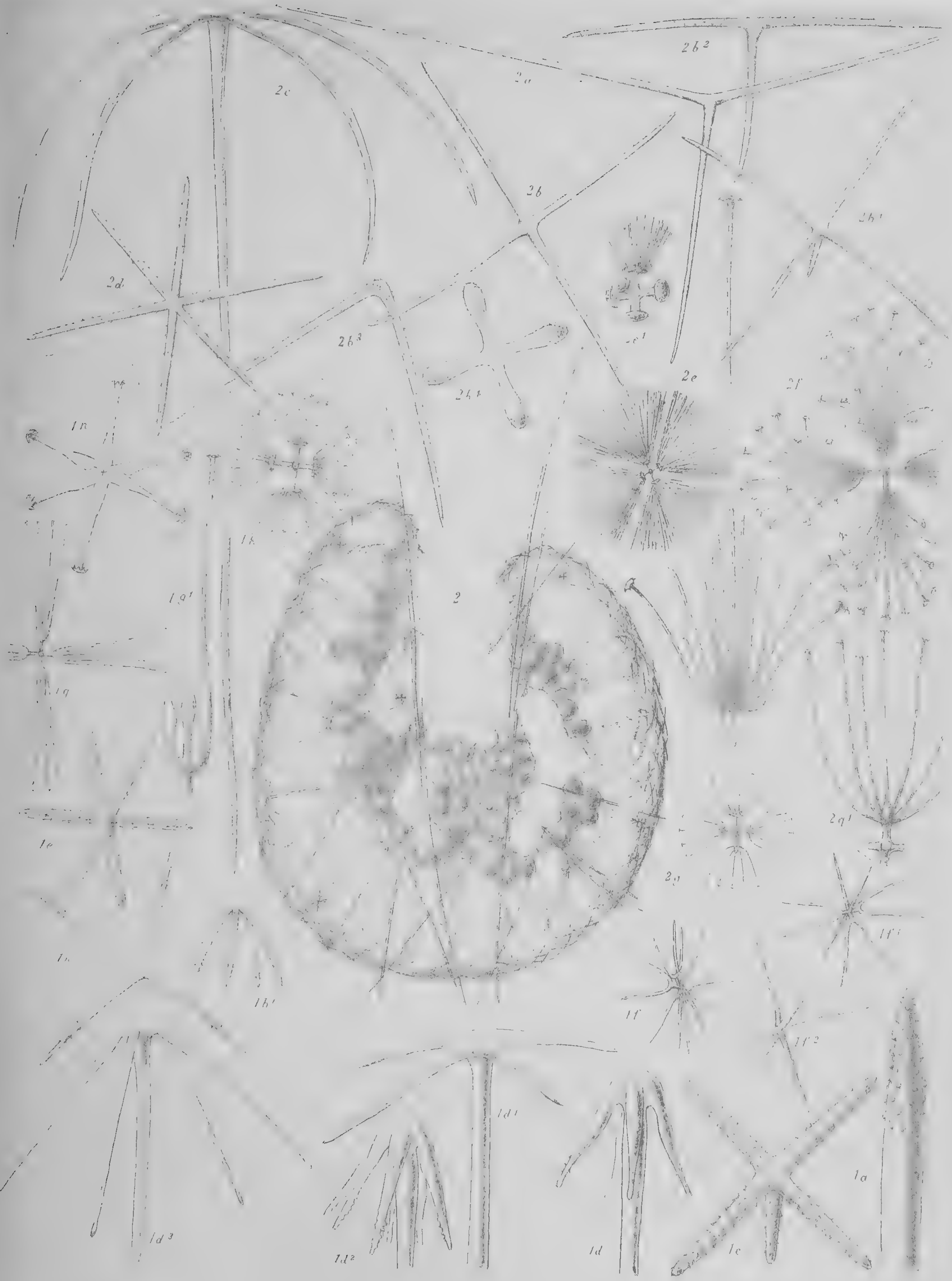
PLATE VII.

FIG. 1*a–k*.—*Aulorossella longstaffi*. Spicules. (Page 19.)
FIG. 1*a*.—One end of large parenchymal diactin. (× 50.)
FIG. 1*b*, $1b^1$.—Pyramidal parenchymal tetractin. (× 50.)
FIG. 1*c*.—Autodermal pentactin. (× 160.)
FIG. 1*d*, $1d^1$, $1d^2$, $1d^3$.—Hypodermal pentactins. (× 50.)
FIG. 1*e*.—Autogastral hexactin. (× 160.)
FIG. 1*f*.—Holoxyhexaster. (× 240.)
FIG. $1f^1$.—Hemioxyhexaster. (× 240.)
FIG. $1f^2$.—Monoxyhexaster. (× 240.)
FIG. 1*g*.—Calycocome. (Optic. sect.) (× 240.)
FIG. $1g^1$.—Part of same. (× 700.)
FIG. 1*h*.—Monodiscohexaster. (× 700.)
FIG. 1*k*.—Microdiscohexaster. (Optic. sect.) (× 700.)

FIG. 2–$2g^1$.—*Anoxycalyx ijimai*. (Page 23.)
FIG. 2.—Section of bud. (× 30.)
FIG. 2*a*.—Parenchymal triactin. (× 50.)
FIG. 2*b*.—Autodermal stauractin. (× 160.)
FIG. $2b^1$.—Autodermal pentactin. (× 160.)
FIG. $2b^2$.—Autodermal tauactin. (× 160.)
FIG. $2b^3$.—Autodermal angular diactin. (× 160.)
FIG. $2b^4$.—Modified autodermal stauractin. (× 160.)
FIG. 2*c*.—Hypodermal pentactin. (× 50.)
FIG. 2*d*.—Autogastral hexactin. (× 160.)
FIG. 2*e*.—Graphiocome. (Optic. sect.) (× 240.)
FIG. $2e^1$.—A part of same. (× 700.)
FIG. 2*f*.—Strobilocome. (Optic. sect.) (× 240.)
FIG. $2f^1$.—A part of same. (× 700.)
FIG. 2*g*.—Microdiscohexaster. (Optic. sect.) (× 240.)
FIG. $2g^1$.—The same. (× 700.)



MARINE ALGÆ.

I.—PHÆOPHYCEÆ AND FLORIDEÆ.

By Antony Gepp, M.A., F.L.S., and Ethel S. Gepp.

(Four Plates.)

Though the number of species, apart from the Corallinaceæ, collected within the Antarctic Circle by the British Antarctic Expedition is but small, and the specimens themselves are mostly fragmentary and badly preserved, yet among them are included some interesting novelties. Some of these were briefly described in the Journal of Botany, April, 1905, pp. 105–109, with the algæ of the Scottish National Antarctic Expedition. One of them, which is common to both collections, *Gracilaria simplex* (*Leptosarca simplex*), is unfortunately only represented in the present collection by dried and crushed material; and though it is markedly distinguished by its vegetative structure, the details of this could not be worked out until the clue was given us by some pickled material in the 'Scotia' collection. A second species of *Gracilaria*, *G. dumontioides*, comes from Cape Adare, and is extremely interesting from the point of view of distribution, for it appears to be the same as an Arctic species which was collected in 1853 by Dr. David Lyall in the very northerly latitude of Northumberland Sound, and was named *Halosaccion dumontioides* by Harvey, but never described; for he had dried sterile material only, in which, through the collapse of the inner cells, the structure is obscured.

Magnificent specimens of *Lessonia grandifolia* were brought back by the 'Discovery,' the largest lamina attaining a length of 24 feet before it was dried. Infant plants of the same species (about one inch long) were found attached to *Desmarestia harveyana*. We erroneously recorded (Journal of Botany, *loc. cit.*) *L. grandifolia* as having been collected in the South Orkneys by the Scottish Expedition. Though we found the two plants so much alike in external habit, we have been compelled, after a further examination of their minute structure, to separate them specifically. The 'Scotia' plant will be found below, described under the name *L. simulans*. The occurrence of two such large new species of algæ is a rather startling indication of how much may yet remain to be investigated in the South Polar marine flora.

A small plant of *Zonaria* was found, which is too young to identify; but it is interesting as the first record of this genus from the South Polar regions.

Desmarestia harveyana (*D. media* of the Flora Antarctica) appears to have been abundant, and a specimen of over six feet in length has been brought home in the collection.

Phyllophora antarctica is the Antarctic congener of the northern species *P. interrupta.*

Spongoclonium orthocladum is a new species, allied to *S. hirtum* (*Callithamnion hirtum* of the Flora Antarctica).

The conditions of life that control the algal flora at both poles are peculiar, and are not easily realised by those who have never visited the polar regions. The two totally distinct seasons—on the one hand, the prolonged winter night, together with the impenetrable crust of ice that effectually cuts off the sea from contact with the gases of the atmosphere sometimes for years, the increasing salinity of the water, due to the rejection of salt during the formation of the deep layers of ice, the equable, low temperature of the denser, deeper waters below the ice; on the other hand, the long summer day, accompanied by the breaking of the ice and melting of the ice and snow, the layer of fresher water on the surface, which slowly mingles with the sea-water below, the renewed absorption of atmospheric gases, the assimilation of carbonic acid excreted by the animals living there—these and other factors must profoundly influence and modify algal life and development; and data concerning the effect of these conditions upon algæ have yet to be accumulated.

A critical comparison of the marine floras of the two Polar regions should bring out points of great interest; and a fair field in this respect lies open to that expedition which is the last to publish the report of its collection of marine algæ. Any attempt to draw up such a comparison now would necessarily be premature and incomplete. We await with interest the publication of the results of the other expeditions, in the hope that they may yield a more complete representation of the algal flora peculiar to the Antarctic region, and that incidentally they may throw light upon those points which we are compelled to leave in obscurity.

PHÆOPHYCEÆ.

1. Zonaria sp.

Off Cape Wadsworth, Coulman Island.

A small, immature plant, 2 cm. high, the thallus of which is still monostromatic throughout. Though unable to name the species, we think it worth while to include the plant in our list, as the genus has not yet been recorded from the far South. *Zonaria* is here used in its old and wide sense, as the specimen is too fragmentary to admit of further classification.

2. Lessonia grandifolia.

(Plates I. and II , figs. 5–9.)

Lessonia grandifolia, Gepp, Journal of Botany, 1905, p. 105.

Callus radicalis dense et irregulariter ramosus, coriaceus. Stipes valde compressus, marginibus obtusis, bis vel ter vel quater dichotomus, subter quamque dichotomiam complanate expansus; rami sectione transversali plano-convexi ancipites marginibus acutis, laxe torti. Stipes totus e callo usque ad laminas 30–120 cm. Laminæ lanceolato-lineares longissimae (1–8 met.), latæ (8–45 cm.), marginibus grosse undulatis integerrimis, apice deleto, fissiles, in statu sicco coriaceæ sed fragiles. Stipitis substantia lacunis annulisque carens. Laminæ substantia coriacea e stratis tribus composita; cellulis corticalibus minutis fuscis congestis in series verticales breves dispositis; subcorticalibus rotundatis 1–2—seriatis quam corticalibus magnitudine duplo majoribus; hyphis medullaribus hyalinis extrorsum dense introrsum laxe invicem juxtapositis flexuosis tubulos multos subinfundibuliformes vaginâ e cellulis parvulis compositâ vestitos circumstantibus. Zoosporangia ignota. Figs. 1–9.

Cape Adare (Jan. 9, 1902), hauled up with anchor from 18 fathoms; Coulman Island, off Cape Wadsworth, 18 fathoms.

In our previous account of this species (Journal of Botany, *l.c.*) we quoted specimens gathered both by the Scottish and the British Expeditions, and from the order in which they were cited it would naturally be inferred that the type described was the 'Scotia' plant. We wish to state that the type was and is the 'Discovery' plant, and that the diagnosis was founded upon it alone, the 'Scotia' material being too fragmentary to furnish data for a complete description. Though at the time we regarded the 'Scotia' fragments as belonging to *L. grandifolia*, we are now convinced, after having examined more carefully their microscopic structure, that the 'Scotia' and 'Discovery' plants must be distinguished specifically. We therefore describe them both in detail.

L. grandifolia is one of the larger species of *Lessonia*, but is not one of the dendroid members of the genus, that is, it has not the sturdy, round, tough, persistent, well-developed stem, apically branched, and showing rings of secondary thickening, which is so marked a feature of *L. fuscescens* and *L. nigrescens*. In *L. grandifolia* the stem is subsidiary to the laminæ, and the species is distinguished from all the rest of the genus by the great size of its unsplit laminæ; the largest laminæ previously recorded for any of the species were 60–90 cm. in length, and occurred in *L. fuscescens*, Bory (Hooker, Flora Antarctica, I. 1847, p. 458).

In our specimens of *L. grandifolia* the largest lamina is 5·7 m. when dry, and, when first taken out of the formalin solution in which it was preserved, measured 7·3 m. in length by 45 cm. in width. Another lamina measured 4·5 m. by 35 cm. wide when moist before desiccation. None of the mature fronds are complete at the apex, but we are unable to say whether or not this means that the previous year's

growth has died off above. These laminæ are simple, with undulate margins, and in this respect resemble somewhat those of *Laminaria saccharina*; but are of course far larger, and arise from a branched stem (figs. 1a and 1b).

The main stem is attached to the substratum by a dense ramified mass of leathery holdfasts, and is very short (15–22 cm. long), much compressed (5 cm. wide by about 1·5 cm. thick), in transverse section concavo-convex with rounded margins (fig. 3a, diagrammatic). It is divided above dichotomously into two branches which are much compressed, two-edged, laxly twisted, simple or 2–3 times dichotomously branched, and much flattened and expanded below each dichotomy. These branches vary in length from 15–105 cm., the younger branches being the longest; they gradually taper upwards, and before expanding gradually or quickly into the great flat fronds, are reduced to a width of 1·5–2·5 cm. when moist, and 0·3–0·7 cm. when dried. At this thinnest point they tend to decay most readily when being dried.

The branching of *L. grandifolia* is dichotomous, and we can find no indication in either the mature or very young specimens that the dichotomies are the result of a splitting of the developed frond such as is characteristic of some of the other species of *Lessonia*. Further, in some very young plants (fig. 2) of *L. grandifolia*, which we found growing on *Desmarestia harveyana*, it is interesting to note that though but 1–2 inches long, they are already as much branched as the huge mature plants; and this shows that the dichotomous branching occurs very early in the life-history of the plant, and is not a feature of subsequent development.

The structure of the mature lamina, as seen in transverse section (fig. 5a), consists, like that of the stem and branches, of three strata. Externally is a cortex of small brown cells, placed in short vertical rows, and crowded; beneath it is a subcortical stratum of about 2 rows of rotundate cells twice as large as the cortical cells, and containing a coloured globose mass of contracted protoplasm. This subcortical stratum passes almost at once into the closely packed, short-celled, irregularly flexuose, longitudinal hyphæ which form the external limit of the medulla and which in transverse section form a band of tissue apparently composed of 8–10 rows of subrotundate cells of varying size; the interior of the medulla is composed of hyaline hyphæ mostly running longitudinally, laxly juxtaposed in the gelatinoid matrix and separated from one another by 1–2 times their diameter. Embedded in this medulla and dotted along an irregular median line, which stretches across the lamina from edge to edge, are a number of trumpet-hyphæ, rather resembling those described by Grabendörfer (Bot. Zeit., vol. XLIII., 1885, p. 645, tab. VI., fig. 11) for *L. ovata*, but unlike the latter, they are enclosed each in a sheath of very small cells (fig. 5b). These trumpet-hyphæ run in a sinuous course both longitudinally and transversely, and are found even in the youngest plants. They serve, perhaps, as mucilage tubes. When seen in longitudinal section (fig. 7), they exhibit on their walls very fine and faint transverse striations (confer fig. 9). We have failed to find any such trumpet-hyphæ at all in any other species of *Lessonia* (except *L. simulans*; see p. 6), e.g. *L. fuscescens*, *L.*

nigrescens, and *L. littoralis*; and even in *L. ovata* the "Trichter" (as Grabendörfer calls them) differ in being more inflated at their funnel-shaped ends and quite destitute of a special sheath.

In the very young lamina (½ in. long), the structure is much simplified (fig. 6). The cortical cells are crowded, and obscured by coloured granules and form a monostromatic layer, beneath which is the subcortical stratum of about 2 rows of large cells, round in transverse section, or sometimes twice as long as broad in longitudinal section of lamina (fig. 8). In the middle lies the medulla, consisting of some three or more rows of longitudinal or transverse hyaline hyphæ; among them are very few trumpet-hyphæ, each in its sheath.

As to the structure of the stipes, it is in the main similar to that of the mature lamina, but the cortex is a little thicker and more deeply coloured, the medulla is far thicker and the sub-cortical layer much less distinct. In a transverse section there is a narrow, more opaque, median band stretching right across, along the widest diameter, distinctly visible to the naked eye (fig. 3b). This, under a low power of the microscope, is seen to contain dots and streaks (fig. 3c, and 4), which, under a higher power, are seen to be trumpet-hyphæ in transverse and longitudinal section (fig. 9).

The structure of the basal holdfasts is simple, the main tissue being composed of thin hyaline hyphæ mainly longitudinal, most of them exhibiting a contracted globose mass of coloured protoplasm; this tissue contains no ensheathed trumpet-hyphæ and passes gradually through a cell-like subcortex to a submonostromatic cortex of small cells obscured by coloured granules.

Neither stem nor lamina possess any lacunæ like those that characterise *L. nigrescens* and other species.

L. grandifolia resembles our *L. simulans* in external habit, but differs in structure, as we show under that species. It also approaches *L. laminarioides* in habit, but differs from it in being 10–20 times as large, in having the stems flat and twisted, and the medullary hyphæ interspersed with the ensheathed trumpet-hyphæ mentioned above. *L. ovata*, though, as we have said, possessing trumpet-hyphæ somewhat like those of our plant, is otherwise very different, having small oval laminæ less than 20 cm. long, and a stem which, according to Grabendörfer (*op. cit.*, p. 643), may attain a length of several metres and a thickness of about 10 cm.

3. Lessonia simulans.

(Plate II., fig. 16.)

L. simulans Gepp, Journal of Botany, 1906, p. 425.
L. grandifolia, pro parte Gepp, *op. cit.*, 1905, p. 105, tab. 470, fig. 6.

Planta incompleta. Frons laminarioidea ut in *L. grandifolia*, stipite complanato ancipite suffulta simplex, lanceolato-linearis, longa, lata (12·5 cm. plusve) marginibus integerrimis. Laminae substantia pergamentacea vel coriacea e stratis tribus composita; cellulis corticalibus monostromaticis quadratis granuloso-obscuris; subcorti-

calibus oblongis parenchymaticis in circa 6–7 series dispositis; medullaribus elongatis angustis strictis 9–10 seriatis tubulos perpaucos subinfundibuliformes vagina e cellulis parvulis composita vestitos foventibus. Caetera desunt (fig. 10).

South Orkneys, Scotia Bay, near surface; April, 1904, leg. R. N. Rudmose Brown.

A section of the lamina of this plant was figured in the Journal of Botany (*loc. cit.*) as representing that of *L. grandifolia.* We had at the time no doubt that the 'Scotia' specimens which, though fragmentary, presented so striking an external likeness to the type, were identical with it; for such differences of structure as were apparent seemed to be due to a different method of preservation. The 'Scotia' specimens were preserved in spirit, and exhibited a simpler and clearer cell-structure than the 'Discovery' material, which was preserved in formalin or merely dried. But, after having made a more careful comparison of their microscopic structure, we are convinced that the 'Scotia' plant must be separated off as a proper species, though the material is insufficient to enable us to describe its complete habit.

As regards the structure of the lamina, the cortex is monostromatic and composed of quadratic thin-walled cells with granular contents (not rotundate and densely obscured, as erroneously figured in the Journal of Botany, *loc. cit.*). The subcortical tissue consists of about six layers of larger cells, rounded or oblong, lengthened parallel to the axis of the frond; and the medulla is composed of some nine to ten rows of narrow elongated cells, thick-walled, with a few ensheathed trumpet-hyphæ scattered among them. The medullary cells are sometimes filled with a pale brown mucilage, and their limits are then barely distinguishable.

In the stipes the medulla is the main tissue, and consists of a dense pale-brown mass of hyphæ, chiefly longitudinal (fig. 10) and straight, but here and there mingled with interwoven hyphæ. Scattered in the medulla are a very few trumpet-hyphæ, some with and some without a sheath of very small cells. The medulla externally changes into a pluristromatic subcortex of large round and oblong cells which, passing outwards in radial rows and subdividing, gradually changes to a cortex of three to four rows of small quadrate cells, bounded by distinct cuticle.

The structure of the holdfasts rather resembles that of the stipes, but the strata are less definitely marked; there is a dense medullary mass of hyphæ which towards the periphery change into lax, larger, thin-walled subcortical cells, and these in their turn becoming smaller and smaller, pass into a cortex of small dense-coloured quadrate cells. There are no trumpet-hyphæ in the medulla of the holdfasts.

The most obvious difference between *L. simulans* and *L. grandifolia* is found in the medulla of the lamina. This in the former plant is a very pale-brown tissue of elongated cells with very few ensheathed trumpet-hyphæ. In *L. grandifolia* the medulla is colourless and composed of hyphæ mostly longitudinal, and laxly juxtaposed and separated from one another by one to two times their diameter. The ensheathed trumpet-hyphæ are numerous and obvious, and scattered along an irregular median line. *L. simulans* differs also in having a monostromatic cortex of quadrate cells.

It might be urged that *L. grandifolia* and *L. simulans* are sufficiently distinct from *Lessonia* to constitute a separate genus on account of the following characters:—The laminæ are huge and undergo no multiplication by longitudinal splitting, the stem is poorly developed and exhibits no rings of secondary thickening, and no lacunæ are present in laminæ and stem; moreover, *L. grandifolia* is markedly characterised by the presence of numerous trumpet-hyphæ in the medulla, as also is *L. simulans* to a lesser extent. But though, at one time, we were tempted to separate these species from *Lessonia*, we feel that such intermediate links as *L. laminarioides* and *L. ovata* are too strong to admit of a generic separation, however great the contrast may be between our plants and the typical dendroid species, *L. fuscescens* and *L. nigrescens*, upon which the genus was founded. Further, we would suggest that whereas *L. fuscescens* and *L. nigrescens* are evidently sturdy perennials, *L. grandifolia* and *L. simulans*, with their weak stems, may possibly be mere annual or biennial plants. Moreover, as mentioned in the introduction, the local conditions of life in the Antarctic Ocean are peculiar, and though during the long winter night the growth of our two species may be inhibited, or even replaced by decay, yet during the perpetual daylight of summer they may possibly have a special capacity for rapid growth, and thus perhaps attain in one season the huge dimensions of our specimens. If such be the case, we would suggest that the trumpet-hyphæ, the actual function of which is unknown to us, may perhaps facilitate rapid growth by providing channels for the ready transference of food-material and waste products. That these trumpet-hyphæ are connected in some way with the local conditions of life seems evident from the abundant occurrence of similar ensheathed hyphæ in *Desmarestia harveyana* (figs. 14a, 13b), an Antarctic species which grows to a considerable length.

4. Desmarestia harveyana.

(Plate III., figs. 11–15.)

Desmarestia harveyana, Gepp, Journal of Botany, 1905, p. 106 (figs. 11–15).

D. media Hook. f. et Harv. Flor. Antarct. II. (1847), p. 466; Kützing, Tab. Phyc. IX. (1859), tab. 95, fig. II.; haud Grev. Synops. (1830), p. XL.

D. aculeata var. *compressa* Reinsch in Flora, 71 (1888), p. 190; et in Internat. Polarforsch. 1882–1883, Deutsch. Exped. Band II. (1890), p. 408, tab. XVII., fig. 3.

Off Cape Wadsworth, Coulman Island, 18 fathoms; Cape Adare, February 24, 1904.

Geogr. Distrib.—Cockburn Island. South Georgia.

Specimens of this plant were preserved both dry and in formalin. One of the latter is as much as 6 feet long, but being incomplete, must have been longer still when growing. They agree absolutely with those from Cockburn Island, collected by D. Lyall on Ross's Antarctic Expedition (1839–1842). Lyall's specimens in the British Museum are named *D. media* in Harvey's MS. Harvey, indeed, was strongly of opinion that they are identical with *D. media* Grev., *i.e.*, *Sporochnus medius* C.Ag., collected at Unalaschka by Chamisso, and figured by C. Agardh in his *Icon. Alg. ined.*, tab. 16 (1822). Although we have not seen Agardh's type, we are so convinced that it is

distinct from our Antarctic plants that we are compelled to separate these latter off under a new specific name. Agardh's plant appears to have stem and branches terete, and the branches become gradually thicker towards their base as they are traced downwards into the stem. In *D. harveyana* the stem and branches are flat when dry, elliptical when moist, and the branches gradually become attenuated towards the base before joining the stem. Setchell and Gardner (Algæ of N.W. America, 1903, p. 247) also keep these plants separate, maintaining that the Antarctic *D. media* Kütz. (Tab. Phyc. IX., p. 40, t. 95, II.), which equals *D. harveyana*, is not the same as the North Pacific *D. media* (Ag.), Grev., which they call *D. aculeata*, var. *media* J.Ag. Under the latter name they cite No. 353 of Tilden's American Algæ, a specimen of which we have examined. It bears a descriptive label saying "stem and branches traversed (axially) by an articulated filament surrounded by a layer made up of larger (air cavities) and smaller cells." This we take to be the structure of typical *D. media* Ag.; and we do not find it to be identical with the structure of *D. harveyana*. For in *D. harveyana* a transverse section of the elliptical stem (fig. 13a) shows, in addition to the primary axial articulated filament, two or more parallel articulated tubes cut across and situated at irregular intervals more or less on the longest diameter of the ellipse, running longitudinally up and down the stem, each of the tubes being ringed round by a sheath of small cells (pl. iii., figs. 13b and 14b). The actual position and inter-relations of these tubes are at once seen upon examination of a fairly thick median longitudinal section (fig. 14a), cut parallel to the flattened surfaces of the complanate thallus. Sufficiently good sections are quickly obtained by the rough-and-ready method of shaving off the opaque cortex and then slicing down the flat medulla with a sharp scalpel, the material being held gently between finger and thumb. The primary filament with its septa and sheath of minute cells is then visible in the axis of the thallus. At intervals it puts out on one or other side a lateral tube which bends upwards, and after running subparallel to the axis for about 4 mm. turns outwards into the next lateral branch above (fig. 14a). There are also two or more thinner secondary tubes parallel to the axial filament, sheathed, and dividing usually at long intervals; these divisions anastomose with one another here and there, and occasionally with the main filament. We think it possible that these tubes are the "einzelne nicht regelmässig vertheilte grössere Zellen, umringt von um die Hälfte kleineren" described by Reinsch (Flora 71, 1888, p. 190) as characteristic of his South Georgian *D. aculeata*, var. *compressa*, which plant would then be a synonym of *D. harveyana*.

One of the forms recorded from the southern oceans is *D. viridis* var. *distans* Hook. et Harv., specimens of which are preserved in the British Museum. Though they somewhat resemble *D. harveyana* in habit, they differ from it in structure. The structure is comparable with that of typical *D. viridis*. A figure (fig. 16) is given here of a transverse section of the thallus of *D. viridis* var. *distans*, for comparison with that of *D. harveyana*.

While referring to the southern species of *Desmarestia*, it may be worth while to point out a slight error in the key to the species which Reinsch publishes in Flora, 1888, pp. 189, 190. He classes *D. chordalis* with *D. viridis* as having its ultimate pinnules uncorticated. He had apparently never seen *D. chordalis*, and he misinterpreted Harvey's "apice longe nudis" (Flor. Antarct. Part II., p. 467) as meaning uncorticated, whereas it simply means unarmed with spinules. We would point out that in *D. harveyana* the axial hyphæ are corticated to the very tips of the ultimate ramuli (fig. 12).

5. Ectocarpus geminatus.

Ectocarpus geminatus Hook. et Harv., London Journal of Botany IV. (1845) p. 251.

Cape Adare, with plurilocular sporangia, epiphytic on *Desmarestia harveyana*.

Geogr. Distr.—Cape Horn, Falkland Islands, Kerguelen.

This species is well figured by Hariot in Mission Scientifique du Cap Horn (1882–3), tom. v. 1889, Algæ, pl. 3, figs. 1, 2. Our attention has been called by Dr. Carl Skottsberg to Reinke's note in the Atlas Deutscher Meeresalgen II. 1892, p. 46, where he proposes to transfer this species to the genus *Isthmoplea*.

FLORIDEÆ.

6. Iridæa micans.

Iridæa micans Bory, Voyage Coquille, 1828, p. 110, tt. 13, 13 bis.

McMurdo Strait, upon the ice of Bay between Black and White Islands, among a heap of sandy matter, a mile north of rock-débris heaps, five miles north of tide-crack at head of bay, September 14, 1902.

Geogr. Distr.—Falkland Islands, Cape Horn, Valparaiso, Auckland Islands.

A fruiting specimen, weathered, faded and fragmentary.

7. Gracilaria sp.

Off Cape Wadsworth, Coulman Island.

A fragment without fruit. The habit is that of *G. multipartita*, and a transverse section of the thallus shows the large thick-walled inner cells, surrounded by smaller ones.

8. Gracilaria simplex.

G. simplex, Gepp, Journal of Botany, 1905, p. 195.
Leptosarca simplex nob. op. cit. 1905, pp. 108, 162.

Frondes plures (8–10) e callo minuto ortæ simplices oblongæ vel lato-cuneatæ planæ membranacæ, 10–15 cm. longæ (apice destructo), 3–8 cm. latæ, c. 230μ

crassæ, inferne in stipitem plus minusve sensim augustatum, 1–3 cm. longum attenuatæ, stratis duobus contextæ cellulis interioribus rotundato-angulatis magnis 2–3 seriatis pachydermis (frondis sterilis majoribus maxime leptodermis collabentibus submonostromaticis); cellulis corticalibus filamenta ramosa verticalia efficientibus, tetrasporangia magna cruciatim divisa foventibus (frondis sterilis majoribus monostromaticis).

Off Cape Wadsworth, Coulman Island.

Geogr. Distr.—South Orkneys.

This species is represented in the 'Discovery' collections by one specimen only, a single thin dried frond 22·5 cm. long by about 1·5 cm. broad at its widest part. Blunt and incomplete at apex, it tapers very gradually down to its attenuated stalk-like base. This frond is quite sterile, and owing to the collapsed condition of its cells as the result of drying, was not in itself sufficient for determination, for we altogether failed to make the cells swell out again. Fortunately we found in the 'Scotia' collection from the South Orkney Islands two specimens, which clearly belong to the same species, and being preserved in spirit, and uncrushed, revealed to us the interior tissue in its natural condition. These 'Scotia' specimens were also sterile, and we described them under the name *Leptosarca simplex* (loc. cit.). Subsequently we received a more complete plant, also from the S. Orkneys, which with a few other algæ had been overlooked in the 'Scotia,' until she was cleared out previous to being sold. This plant bore ten fronds, some sterile, others tetrasporiferous. The two kinds of frond exhibited differences of structure, the sterile being characterised by an internal layer of large, extremely thin-walled cells, bounded by a monostromatic cortex, as described for Leptosarca (*loc. cit.*), while the sporiferous fronds with their large cruciate tetraspores, thicker-walled internal cells and pluristromatic cortex compelled us to transfer this species to *Gracilaria*, of which genus it should perhaps form a new section.

9. Gracilaria dumontioides.

(Plates III. and IV., figs. 17–20.)

Halosaccion dumontioides Harv. ex Dickie, Journ. Linn. Soc. IX. (1867), p. 239 (nomen tantum).
Leptosarca dumontioides nob. in Journal of Botany, April, 1905, p. 108 (nomen tantum).

Frons (vetusta incompleta) linearis, 6·5 longa, 4 mm. lata, complanata, membranacea, prolificationes plurimas, intervallis irregularibus circ. 4 mm. latis invicem separatas, maxime e marginibus ambobus emittens; prolificationes 4–15 cm. longæ infra medium valde attenuatæ tunc sensim sursum expansæ vel anguste lineares 4mm. latæ simplices vel cuneato-lineares latiores apicem versus dichotomæ, ramis valde divergentibus. Color rosaceo-ruber. Cystocarpia et tetrasporangia ignota.

Northumberland Sound, 76° N. lat., July 1853, leg. D. Lyall (fig. 20); Cape Adare, 72° S. lat., February 24, 1904 (fig. 17).

The only Antarctic specimen (fig. 17) which we have seen consists of a scrap of an old frond, destitute of base and apex, encrusted by a zoophyte, and bearing laterally

from its edges about fifty proliferations. The whole plant is quite sterile, of very thin texture, and consists of an internal tissue enclosed in a cortex which is monostromatic except at the margin. The structure, however, owing to the crushed condition of its interior cells, affords but little clue to the systematic position of the plant, and all our efforts to make the internal tissue swell out to its original dimensions were in vain. We were therefore unable to figure the structure except near the much-thickened margin of the proliferating scrap of old frond mentioned above (fig. 18). The cells of the monostromatic cortex are large (fig. 19).

In habit it resembles *Dumontia*, but has not the hollow thallus and filamentous cell-structure of that genus. Our plant has a solid thallus, and for that reason we should not have searched for it under *Halosaccion*, but strangely enough we find the Cape Adare plant to be apparently identical with *H. dumontioides* Harv., an undescribed species from the far North. The habit, the thin texture, the monostromatic layer of rather large coloured cortical cells, and the permanently collapsed internal tissue are the same in both. The proliferations in Harvey's plant are linear and very long (fig. 20); in the Cape Adare plant they are half as long, and are cuneato-linear and tending to be forked at the apex. Dickie (Journ. Linn. Soc. IX. [1867], p. 239) stated that *H. dumontioides* was first described by Prof. Harvey from specimens found by Dr. Lyall in Lat. 76° N. We failed, however, to find any published description, and applied to Dr. E. Perceval Wright, Keeper of Harvey's herbarium, Trinity College, Dublin, for information. He kindly replied:—"I think that a description of *Halosaccion dumontioides* has never appeared. Dr. Lyall's specimens were collected in July, 1853. Harvey was on his Australian tour, 1853–56, and in 1857 was busy with his *Phycologia Australica* (1858–1863). All our sheets with Lyall's specimens are marked in pencil with the name and 'Harv. MS.' Now when Harvey published a name, he mostly wrote the name in ink on the sheet. On one of our sheets he has written, still in pencil, 'Can this be a var. of *H. ramentaceum*?' It is strange that J. G. Agardh did not write to me for a specimen in 1876."—that is, before publishing his *Epicrisis*.

Harvey, having only dried material to work upon, and being therefore unable to determine the character of the internal tissue, was in doubt as to the affinity of the plant, and placed it in *Halosaccion* near *H. ramentaceum*. There we should have been compelled to leave it, had we not found a similar crushed tissue and monostromatic cortex in another species, *Gracilaria simplex*, of which we had received not only dried specimens, but also spirit material, and to which we regard our plant as closely allied. However, none of the specimens of either species have cystocarps, and their systematic position may have to be reconsidered later.*

Dickie (*loc. cit.*) records plants collected in Cumberland Sound (66° N. lat.) by

* Since these lines were sent to press we have seen some very fine Antarctic specimens, collected by Dr. C. Skottsberg during the Swedish South Polar Expedition, which lead us to believe that our Antarctic plant is not fully grown, and is not conspecific with Harvey's plant of *G. dumontioides*. Dr. Skottsberg will deal with the question in his own report.

James Taylor. These are in the British Museum, and are small (about 10 cm. long). They appear to be the same species, but are stouter in texture. Lyall's specimens, of which there are fine examples in the British Museum and in the Kew herbarium, measure 30–40 cm. and bear the MS. note—" a *small* specimen." They were collected in Northumberland Sound, Queen's Channel (76° 5′ N. lat., 97° W. long.) on July 14, 1853, during Belcher's Expedition.

The distribution of the species is notable. It occurs only in the extreme north (76° N. lat.) and in the extreme south (72° S. lat.).

10. Plocamium coccineum.

Plocamium coccineum Lyngb., Tent. Hydroph. Danic. 1819, p. 39, t. 9

Off Cape Wadsworth, Coulman Island, with cystocarps.

Geogr. Distr.—Mediterranean, N. and S. Atlantic, N. Pacific, Cape of Good Hope, Australia, Tasmania.

11. Delesseria quercifolia.

Delesseria quercifolia Bory, Voyage Coquille, 1828, p. 186, t. 18, fig. 1.

Off Cape Wadsworth, Coulman Island.

Geogr. Distr.—North Pacific, Falklands, Cape Horn, Kerguelen.

Sterile and somewhat battered specimens.

12. Phyllophora antarctica.

(Plate IV., figs. 21 and 22.)

Phyllophora antarctica Gepp, Journal of Botany, 1905, p. 109.

Off Cape Wadsworth, Coulman Island.

Frons e stipite brevi mox in laminam membranaceam ligulatam sæpius opposito-sinuatam simplicem vel dichotomam expansa, ramis approximatis sinu angustissimo et ad apicem et secundum margines prolificantibus; cystocarpiis marginalibus pedicellatis; tetrasporangia ignota (figs. 21, 22).

This species is represented in the collection by several specimens, both fertile and sterile, mostly fragmentary, and exhibiting considerable variability of external form (fig. 21b). The longest specimen (fig. 21a), though incomplete, is about 17 cm. high and about 1 cm. broad, with a single dichotomy. The smallest complete specimen is 5 cm. long and unbranched. The lamina is membranaceous and ligulate, slightly undulate at the margin, with shallow constrictions at intervals of about 2 cm.; where a dichotomy occurs the branches are very close together, almost touching. The proliferations along the margin are often numerous, and are usually quite small, whilst those at the apex are sometimes as large as the primary frond; and where three or four occur together, they give the plant a digitate appearance. In transverse section the thallus is seen to be composed of two strata. Within are two to three rows of lax, empty, polygonal, very thick-walled medullary cells, surrounded by a cortex of two to three rows of minute flattened coloured cells (fig. 22). The cystocarps are marginal,

either sessile or very shortly pedicellate, ovoid and bluntly rostrate. The pericarp is composed of six or more rows of cells in vertical series.

Its nearest ally is *P. interrupta*, which it somewhat resembles in external form; but it differs from that species in having simpler and more longly dichotomous branching (being very rarely or never palmate), and the apices of the branches ligulate and not reniform or rotundate. The thallus is not moniliform or torulose, but merely opposito-sinuate. *P. interrupta* is more shortly dichotomous, and often has a triangular expansion below its dichotomy, and palmate branching. The constrictions, too, are often reduced to almost stalk-like thinness, which is not the case in *P. antarctica*. *P. interrupta* is an Arctic species, and *P. antarctica* appears to be its Antarctic congener. Possibly they are antipodal polar descendants from a common ancestor.

P. Brodiæi J. Ag. differs in its long stipes cuneately expanded into a more or less palmate frond, and is apparently the Arctic congener of the Antarctic *P. cuneifolia*, which has shorter stipes, broader less-lobed frond, and broader shorter lobes with shallower sinus.

13. Spongoclonium orthocladum.

(Plate IV., figs. 23–25.)

Frons 8 cm. alta dense fruticulosa axi centrali erecto tereti rhizoidibus haud corticato ramulis ascendentibus velato, quoquoversum ramoso, ramis cauli similibus ramulis ultimis longis erecto-patentibus simplicibus strictis subulatis, articulis diametro sesquilongioribus, articulo basali nunc nudo nunc procarpium intra ramellorum minutorum fasciculum emittente. Tetrasporangia ignota.

Cape Adare, January 9, 1902.

This is a densely bushy plant (fig. 23) of moderate size, about 8 cm. high without the basal attachment and without tetraspores, but bearing young procarpia with trichogynes (figs. 25a, 25b), and so thickly infested with diatoms that it is difficult to obtain a clear view of its ramification. *S. orthocladum* is remarkable for its long straight subulate ultimate branchlets (fig. 24), and differs in this respect from all the fruticulose Callithamnioid species which we have seen. Its nearest ally is found in certain states of *S. hirtum* [*Callithamnion hirtum* Hook. f. and Harv. in Flora Antarctica, II. (1847), pl. lxxviii., figs. 3 and 4], a plant recorded from the Auckland Islands and New Zealand. The typical plant, it is true, differs *inter alia* in having ultimate pinnæ consisting of a flexuose rachis bearing sub-distichous incurved obtuse ramelli. There is, however, in the British Museum a specimen from Cook's Straits, New Zealand, collected by David Lyall and named by Harvey, which, though normal in most respects, yet has a few branches which break up into long, straight, subulate ramelli like those of our plant.

EXPLANATION OF PLATES I—IV.

PLATE I.

Lessonia grandifolia nob. Figs. 1*a*, 1*b*. Mature fronds, showing flattened stipes dichotomously branched and usually twisted, bearing long, simple, flat fronds with undulate margins and broken apex; $\frac{1}{12}$ natural size. Fig. 2. Three very young plants attached to a branch of *Desmarestia harveyana*, and exhibiting even at this early stage almost as much branching as is found in a mature plant; natural size. Fig. 3*a*. Transverse section (diagrammatic, and showing no cell-structure) of stipes at base of fig. 1*a*, showing concavo-convex form and rounded-obtuse margins; natural size. Fig. 3*b*. Transverse section of stipes, being the top of the cut branch on the left of fig. 1*b*, and showing two acute margins and a long, light-coloured intra-medullary band; natural size. Fig. 3*c*. Portion of same (about two-thirds of its width), showing that the intra-medullary band is composed of the cross-sections of scattered trumpet-hyphæ; the bulk of the section consists of medulla, limited on the outside by the indistinct subcortex and the pigmented cortical stratum. (× 10.) Fig. 4. The same in longitudinal section; the medulla here is also indicated by the trumpet-hyphæ, which appear as longitudinal streaks. (× 10.)

PLATE II.

Lessonia grandifolia (continued). Fig. 5*a*. Transverse section of mature lamina, representing one-half only of its thickness, and showing on the left the short, vertical rows of pigmented cortical cells; beneath this is the subcortical stratum of about 2 rows of rotundate cells, which are twice as large as the cortical cells and pass into the closely packed hyphæ which form the outermost portion of the medulla and appear here as round cells, but are shown to be hyphæ in longitudinal section (compare fig. 7); these hyaline hyphæ become more and more separated towards the middle of the medulla, and run in various directions through the gelatinoid matrix, and among them are shown a few ensheathed trumpet-hyphæ. (× 110.) Fig. 5*b*. Small portion of similar section, showing four trumpet-hyphæ with their sheaths of small cells and a few of the ordinary hyaline hyphæ of the medulla. (× 450.) Fig. 6. Transverse section through a very young lamina (as in fig. 2), showing a monostromatic cortex of granular coloured cells, a subcortical layer of 1–2 rows of large clear cells, and a medulla composed of a few lax hyphæ and one ensheathed trumpet-hypha. (× 450.) Fig. 7. Longitudinal section of mature lamina representing half the thickness of the frond, and showing (as in fig. 5*a*) the short vertical rows of pigmented cortical cells; the subcortex of 1–2 rows of rotundate cells twice as large as the cortical cells; and the medullary hyphæ densely packed on the outer side and becoming gradually more laxly arranged towards the interior, where, interspersed among them, are portions of three trumpet-hyphæ in longitudinal and one in transverse section. (× 110.) Fig. 8. Longitudinal section of very young frond, showing the three strata already described for fig. 6. (× 340.) Fig. 9. Portion of medulla of stipes in longitudinal section, showing a trumpet-hypha with its sheath of small cells and its wall densely marked with transverse striæ; the cell-contents have contracted into a narrow strand along the axis of the cell. (× 450.)

Lessonia simulans sp. nov. Fig. 10. Outer part of a longitudinal section of stipes, representing the external part of the medulla, which is composed of densely packed straight hyphæ; these latter externally pass gradually into a pluristromatic subcortex of large round and transversely oblong cells which, running radially outwards towards the periphery, subdivide more and more, forming a cortex composed of short vertical rows of small quadrate cells. (× 110.)

PLATE III.

Desmarestia harveyana nob. Fig. 11. Small portion of a large plant, showing that the ramification is always opposite; natural size. Fig. 12. Apex of an ultimate branchlet in surface view, showing that the cortex is continued to the very apex of the axial filament. (× 110.) Fig. 13*a*. Transverse section of a mature stem, showing its compressed form; in the centre is the ensheathed primary axial filament and,

to the right and left, some fifteen secondary similar filaments each in its sheath of small cells. (× 25.) Fig. 13*b*. Part of the same, showing an ensheathed secondary filament apparently containing tyloses; the large cavity on the left is merely an ordinary cell of the thallus. (× 450.) Fig. 14*a*. Longitudinal section of mature stem, showing the primary axial filament with its branches (secondary filaments) and their anastomoses; all these filaments are distantly articulated. (× 4.) Fig. 14*b*. Small portion of longitudinal section of stem, showing a secondary filament faintly indicated within its sheath of small cells. (× 340.) Fig. 15. Transverse section of an ultimate ramulus showing the primary axial filament in the centre. (× 110.)

Desmarestia viridis Lam. var. *distans*, Hook. and Harv. Fig. 16. Transverse section of stem, showing a denser medullary tissue in which the primary axial filament has become obliterated. (× 25.)

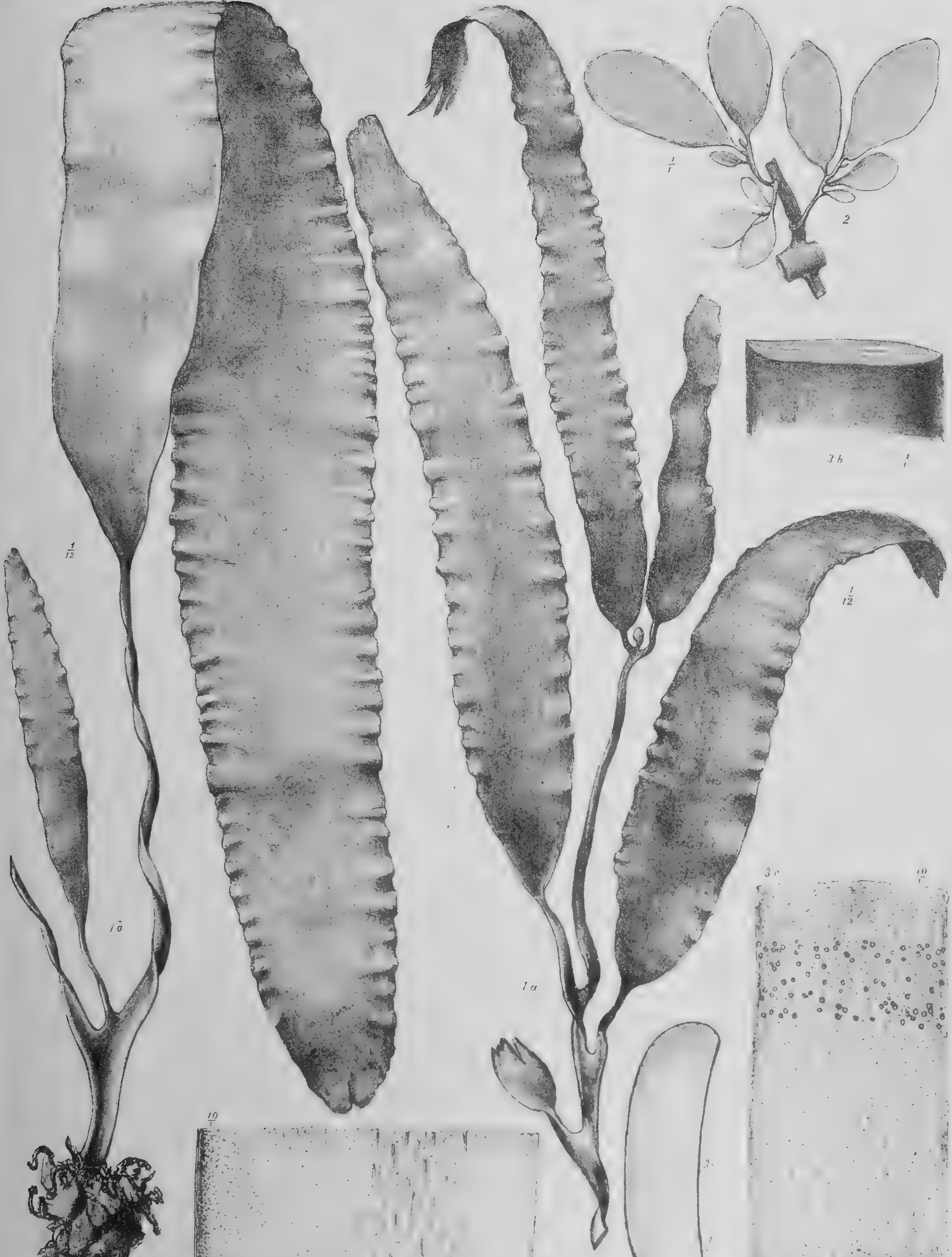
Gracilaria dumontioides nob. Fig. 17. Antarctic specimen consisting of numerous cuneato-linear proliferations arising from a fragment of an old frond; natural size.

PLATE IV.

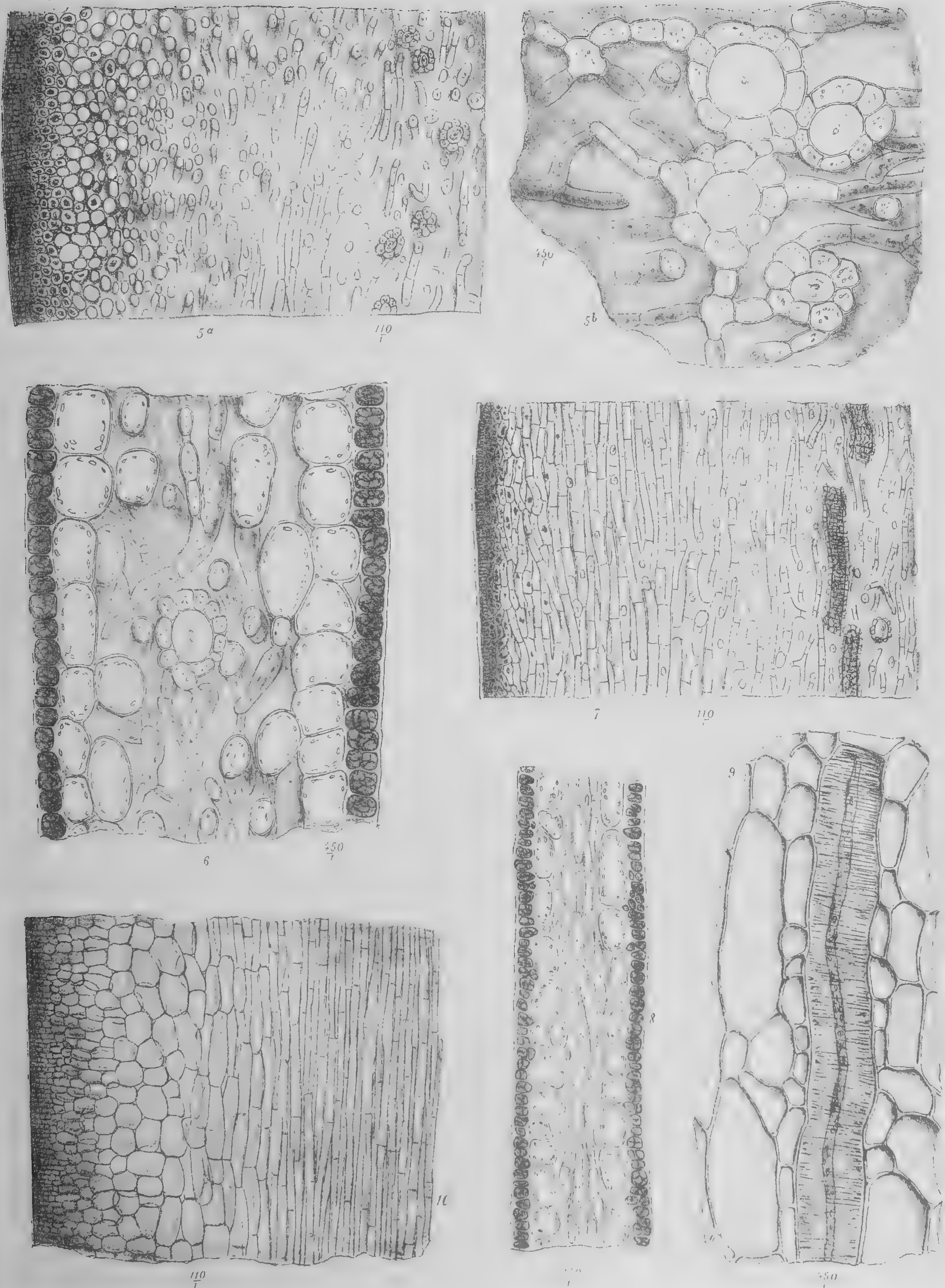
Gracilaria dumontioides—(continued). Fig. 18. Transverse section of the above-mentioned fragment of old frond near its margin, where the cortex becomes thicker and polystromatic; the internal tissue consists of large cells permanently flattened in drying the plant. (× 400.) Fig. 19. Monostromatic cortex in surface view. (× 650.) Fig. 20. Arctic plant named by Harvey *Halosaccion dumontioides*, collected by Dr. Lyall in lat. 76° N., and preserved in the British Museum; its proliferations are very long and simply linear; natural size.

Phyllophora antarctica nob. Fig. 21*a*. Plant bearing marginal cystocarps; natural size. Fig. 21*b*. Sterile plant bearing large and small proliferations; natural size. Fig. 22. Longitudinal section of cystocarpic branch, containing a compound cystocarpic nucleus. (× 80.)

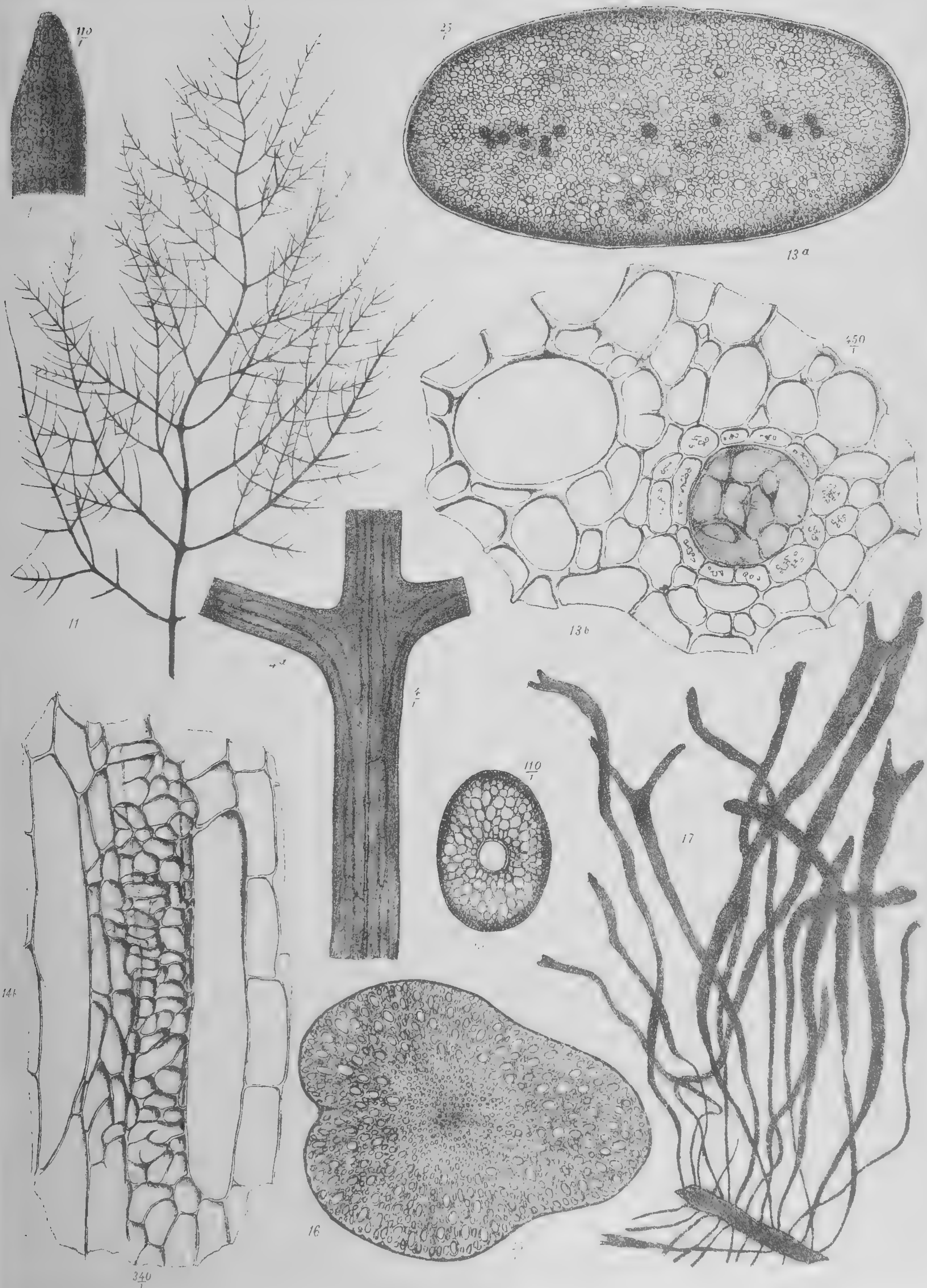
Spongoclonium orthocladum sp. nov. Fig. 23. Part of plant; natural size. Fig. 24. Rather diagrammatic representation of apical part of a branch, showing the long, straight, subulate ramelli. (× 35.) Figs. 25*a*, 25*b*. Young procarpia with trichogyne.



Antarctic (Discovery) Exp. Algæ. Pl. 1. P. Highley, London



Antarctic (Discovery) Exp. Algæ Pl. 2. Highley, London.



110/1
25/1
13 a
450/1
11
13 b
4/1
110/1
17
14b
16
340/1

Antarctic (Discovery) Exp. Algæ. Pl. 4 P. Highley, London

MARINE ALGÆ.

II.—CORALLINACEÆ.

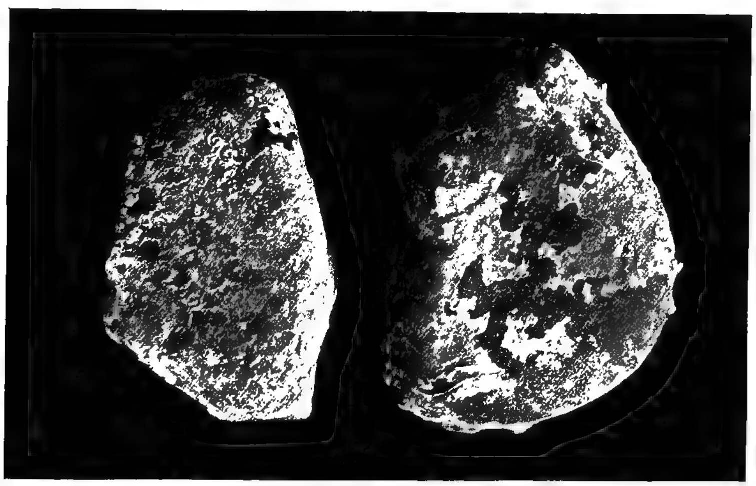
By M. Foslie.

LITHOTHAMNION COULMANICUM.

Among the Natural History collections made in the Antarctic regions by the 'Discovery' Expedition are some specimens of a calcareous alga, which has been kindly sent me for determination. They proved to represent a species new to science belonging to the genus *Lithothamnion*, which I shall now describe. The species has been shortly mentioned in "Det Kgl. norske Videnskabers Selskabs Aarsberetning" for 1904, p. 16 (Trondhjem, 1905), under the name of

LITHOTHAMNION COULMANICUM Foslie.

The plant forms incrustations on pebbles. The crust is closely adherent to the substratum when young, but when older it is here and there rather easily detached,



Lithothamnion coulmanicum Fosl. Nat. size.

particularly when attacked by animals or when covering extraneous objects. It is thin, in the specimens brought home the thickness not exceeding 800μ, frequently being less, or about 300μ. The shape of young crusts is frequently more or less irregular, but now and then almost circular, and so also when older, but then the plant sometimes fully surrounds the substratum. It is sometimes indistinct concentric zonate, and the edge is crenulate or irregular. Several crusts are often found on the same substratum. They may run into each other, in some cases not showing any visible mark where the joining takes place, in others here and there forming slightly elevated ridges. The nature of the surface is determined by that of the substratum. If this is smooth the crust is also smooth, and shines slightly when young. Older

crusts often become a little uneven and finely rugged on the surface by growing over small extraneous objects. Besides, in most of the specimens collected the surface of the crust is somewhat rubbed, probably owing to the friction of the water by a rather strong current. A similar appearance is often to be seen in northern *Lithothamnia*, particularly in sounds where the tides run strongly.

In a vertical section of the crust the basal hypothallic layer is distinctly, but not strongly, developed, and the convergence of the lower anticlines of this layer towards the substratum is very feeble or wanting. The cells are 12–18μ long and 4–7μ broad. In the perithallic layer there is no stratification to be seen. The cells are here partly squarish, often with rounded corners, 5–8μ in diameter, partly and more frequently vertically elongated, and 8–12μ long, with a breadth of 6–8μ. Here and there are to be seen cells with the longest diameter in the vertical direction, always, however, in very small numbers in proportion to the squarish or vertically elongated ones. The cell-walls are frequently rather thick.

As regards the organs of reproduction, the cystocarpic conceptacles are somewhat crowded, subhemispheric-conical, but not quite superficial, as is frequently the case in this genus, 300–350 or up to 400μ in diameter, when seen from the surface. They have been found only in one specimen, and most of them are in a state of decomposition. In a few other specimens conceptacles of sporangia occur. They are in some cases rather scattered here and there in the crust, in others somewhat crowded, convex, and but little prominent, often when older almost disc-shaped, 300–400μ in diameter seen from above. The roof is intersected with about thirty to forty muciferous canals, which are crowded in the central portions. The sporangia are two-parted, 90–120μ long and 40–50μ broad. These organs were ripe in the latter half of January. However, the greatest number of conceptacles observed were dissolved, leaving a shallow hole or a cup-shaped scar, which later on becomes effaced by new-formed tissue. Once I met with overgrown conceptacles in the thickest part of a crust, showing that these organs may become fully dissolved only in the thinner and rather young specimens.

The present species stands nearest to *Lithothamnion magellanicum*, the latter, however, being a coarser plant with, as a rule, larger and more prominent conceptacles of sporangia and frequently larger cells. Besides, the sporangia are always four-parted (tetrasporic) in *L. magellanicum*. On the other hand, the species in question in some respects reminds one of the Arctic species *Lithothamnion læve*. Sterile specimens can on a superficial examination easily be confounded with *Lithophyllum decipiens*.

This is the first species known from the Antarctic regions bearing two-parted (bisporic) sporangia. Such were hitherto only known in some species of the genus in question from the Arctic regions.

The plant was collected off Cape Wadsworth on Coulman Island, near South Victoria Land, about 73° 30′ S., 170° W. Here it was picked up from a depth of 18 fms. It seems to have been pretty plentiful, as some sixteen pebbles with incrustations of the species were collected.

MUSCI.

Par J. CARDOT.

(2 Planches.)

Presque toutes les mousses antarctiques connues jusqu'ici provenaient de l'archipel de Graham et des îles voisines, c'est-à-dire de cette partie de l'Antarctide située au sud de l'Amérique, et comprise entre le 60$^{\text{ème}}$ et le 65$^{\text{ème}}$ parallèles. Les espèces rapportées de la Terre Victoria par l'expédition de la 'Discovery,' bien que peu nombreuses, présentent donc beaucoup d'intérêt, non seulement parce qu'elles nous viennent d'une région dont nous ne connaissions absolument rien jusqu'alors au point de vue botanique, mais aussi parce qu'elles sont actuellement les espèces les plus australes connues, ayant été récoltées entre 77° et 78° de latitude Sud.

Il est fort probable qu'elles constituent, avec quelques Lichens, les derniers et chétifs représentants de toute végétation terrestre dans la direction du Pôle austral. Si l'on réfléchit que, d'après les observations thermométriques faites au port d'hivernage de la 'Discovery,' par 77° 50′ lat. S., de février 1902 à février 1904, la température moyenne des deux mois les plus chauds, décembre et janvier, est de 3·80° C. au dessous de zéro (= 24·95° F.); que le maximum observé, en décembre 1903, a été de 5·55° C. au dessus de zéro (= 42 F.), mais que, même pendant ces deux mois d'été, le thermomètre est plusieurs fois descendu en dessous de – 10° C., et qu'en janvier 1904, il a marqué – 15·55° C. (= 4 F.), on peut être surpris qu'il soit encore possible à des végétaux d'une organisation aussi délicate et relativement aussi compliquée que les mousses de se développer et de vivre dans de semblables conditions climatériques.

La plupart portent d'ailleurs les traces de l'âpre lutte qu'elles soutiennent pour l'existence. Toutes forment des gazons extrêmement compacts, afin de pouvoir résister à la pression des épaisses couches de neige qui les recouvrent pendant les longs mois d'hiver. Le *Bryum argenteum*, espèce cosmopolite, se présente ici sous un aspect tellement rabougri que les plus longues tiges que j'ai mesurées ne dépassaient pas une hauteur de 3 millimètres, et que les plus grandes feuilles atteignaient seulement 0·35 millim. Le *Bryum algens*, dont les touffes, souvent à demi noyées dans la boue glaciaire, peuvent atteindre une profondeur de 6 centimètres, présente fréquemment des tiges d'un aspect malade, offrant des parties presque complètement dénudées; sa nervure s'écarte du type caractéristique du genre par l'absence des stéréïdes, et ses fleurs renferment parfois des organes imparfaits, qui semblent être des archégones mal conformés.

Les tiges du *Ceratodon purpureus* émettent souvent des innovations grêles, garnies de feuilles déformées. Dans le *Sarconeurum glaciale*, il est presque impossible de trouver une feuille adulte entière : toutes sont brisées vers leur tiers supérieur, la pointe ainsi détachée servant fort probablement à la reproduction de l'espèce. Aucune des sept mousses rapportées par la 'Discovery' ne présente d'ailleurs de sporogone développé ou en voie de développement ; ce n'est vraisemblablement que dans des circonstances très exceptionnelles que l'une ou l'autre peut arriver à mûrir une capsule.

Un autre intérêt de la petite collection de mousses qui fait l'objet de cette étude est de nous montrer que, comme on devait d'ailleurs s'y attendre, la flore polaire antarctique est probablement très uniforme, puisque sur sept espèces récoltées à la Terre Victoria, cinq (dont trois spéciales à la région antarctique) sont déjà connues de l'archipel de Graham et du détroit de Gerlache.

Voici la liste et la position géographique des localités, avec l'indication des espèces fournies par chacune d'elles :

I. Granite Harbour, lat. S. 77°, long. E. 160°. Jan. 20, 1902.

Ceratodon purpureus Brid. *forma.*
Didymodon gelidus Card. *sp. nova.*
Bryum amblyolepis Card.
„ *algens* Card. *sp. nova.*

II. Mount Terror, lat. S. 78°, long. E. 169°. Jan. 22, 1902.

Sarconeurum glaciale (Hook. fil. et Wils.) Card. et Bryhn.
Bryum argenteum L.

III. 'Discovery' W.Q., lat. S. 78°, long. E. 176°. Dec. 1903.

Sarconeurum glaciale (Hook. fil. et Wils.) Card. et Bryhn.

IV. McMurdo Sound (lat. S. 77°–78°, long. E. 166°), islet in old ice. Dec. 1903.

Bryum argenteum L.
„ *algens* Card. *sp. nova.*
„ *antarcticum* Hook. fil. et Wils.

V. Cape Royds, at the foot of Mount Erebus, lat. S. 77°, long. E. 166°. Jan. 11, 1904.

Bryum argenteum L.

Les récoltes de la 'Discovery' portent à 51 le chiffre des espèces de mousses actuellement constatées dans la région antarctique proprement dite.

DITRICHACEAE.

Ceratodon purpureus.

C. purpureus Brid., Bryol. univ. I, p. 480 (1826).

Granite Harbour, Jan. 20, 1902 ; ster.

Forme en gazons denses, ordinairement assez profonds (4–5 centimètres), plus ou moins encombrés de terre. Feuilles courtes, petites, très variables, tantôt aiguës, à

nervure percurrente ou subexcurrente, tantôt obtuses, à nervure disparaissant sous sommet ; en outre, sur certains échantillons, les tiges se terminent par des innovati grêles, garnies de feuilles écartées, très molles, les supérieures largement ovales, conca brièvement acuminées, ou obtuses-arrondies et souvent cucullées au sommet, et nervure disparaissant alors avant l'extrémité. Ces variations dans la forme des feuil variations qui peuvent se rencontrer sur la même tige, sont probablement dues à causes climatériques. Il existe dans la flore arctique une forme analogue : c'est *C. heterophyllus* Kindb., de l'île St. Paul, dans la mer de Bering, dont les tiges émett des innovations grêles et allongées, garnies de feuilles obtuses ; et Limpricht a dé aussi, sous le nom de var. *obtusifolius*, une forme des Alpes de Styrie qui a égalem les feuilles obtuses et la nervure disparaissant avant le sommet (*Laubmoose*, I, p. 48 —Pl. I, fig. 12 à 17.

POTTIACEÆ.

Sarconeurum glaciale.

S. glaciale (Hook. fil. et Wils.) Card. et Bryhn, *comb. nova.*
Didymodon (?) *glacialis* Hook. fil. et Wils., Fl. antarct. II, p. 408, tab. clii. fig. vi. (1847).
Sarconeurum antarcticum Bryhn, in Nyt Mag. f. Naturvidenskab, B. 40, H. III, pp. 204–207, ta et ii (1902).

Mount Terror, Jan. 22, 1902. 'Discovery' W.Q., Dec. 1903 ; ster.

Cette curieuse mousse fut récoltée pour la première fois en 1843 par Sir Jos Hooker sur l'île Cockburn (archipel de Graham), et décrite en 1847 dans le *Flora antarct* par Hooker fils et Wilson, sous le nom de *Didymodon* (?) *glacialis.* Beaucoup plus ta en 1899, M. Borchgrevink la rapporta de la Terre de Geikie et de la Terre de Newn les échantillons furent communiqués à M. Bryhn, qui, en 1902, créa pour eux le ge *Sarconeurum*, et décrivit l'espèce sous le nom de *S. antarcticum.* Ayant pu compa entre eux des échantillons originaux de la plante récoltée par Hooker et de c recueillie par M. Borchgrevink, j'ai reconnu leur complète identité, et d'accord a M. Bryhn, je substitue au nom de *Sarconeurum antarcticum* celui de *S. glaciale.*

La densité des touffes de cette mousse est ordinairement remarquable ; mais l'un spécimens provenant de la station d'hivernage de la 'Discovery' est particulièrem curieux sous ce rapport : c'est un petit gazon excessivement compact, profond de 1 20 millimètres, formé par les tiges très serrées les unes contre les autres, et enval jusqu'au sommet par un feutre radiculaire brun très abondant ; cette masse dens moule étroitement sur les débris de lave au milieu desquels elle vit, et dont recouvre et entoure complètement quelques-uns des plus petits. Toutes les feui adultes ont la pointe brisée ; seules, les jeunes feuilles en voie de développement sommet des tiges sont entières.

L'organisation de cette plante semble adaptée d'une façon remarquable aux du conditions climatériques au milieu desquelles elle est appelée à vivre : la den extraordinaire de ses touffes lui permet de supporter sans inconvénient la pression

masses de neige qui la recouvrent en hiver, et de résister victorieusement aux alternatives de gel et de dégel auxquelles elle est exposée pendant le court été polaire, tandis que la fragilité et le sectionnement spontané de l'extrémité de ses feuilles lui assurent un mode de reproduction asexuée suppléant efficacement à la propagation par spores.

M. Bryhn a donné de cette espèce une excellente description et de bonnes figures, faisant bien ressortir les caractères si particuliers de la nervure, qui se termine par une pointe charnue, dilatée, formée de cellules très riches en chlorophylle.

Didymodon gelidus.

Caulis gracilis, erectus, simplex vel parcissime ramosus, 3–6 millim. altus. Folia remota, minuta, erecto-patentia, breviuscula, ovato-lanceolata, late acuminata, acuta obtusulave, 0·7–0·8 millim. longa, 0·4–0·45 millim. lata, marginibus integris, tantum in parte superiore papillis prominulis minute crenulatis, ubique planis vel superne parce et anguste revolutis, costa dorso rotundata, basi 50–60 μ crassa, pro more lutescente, sub summo apice evanida vel subpercurrente, cellulis inferioribus rectangulis vel subquadratis, lævibus, pellucidis, mediis et superioribus minutis, obscurulis, subquadratis, papillosis. Cætera desiderantur.

Granite Harbour, Jan. 20, 1902; ster.

Je n'ai trouvé que quelques brins de cette espèce, mélangés parmi les autres mousses. La tige est pourvue d'un faisceau axile bien distinct, ordinairement brun; les cellules corticales sont plus petites que les cellules sous-jacentes, mais peu différentes d'ailleurs. Sur une coupe transversale, la nervure présente une couche épidermique ventrale, formée de cellules analogues à celles du limbe, en dessous de laquelle on trouve des cellules un peu plus grandes, en une ou deux couches, recouvertes sur la face dorsale par deux ou trois assises de cellules plus petites, à parois épaissies et jaunâtres (substéréïdes). Il n'y a ni vraies stéréïdes, ni sténocystes. Par ces caractères anatomiques, de même que par la forme et le tissu des feuilles, cette mousse me paraît devoir prendre place dans le genre *Didymodon*. On peut la comparer au *D. luridus* Hornsch., dont elle diffère par ses faibles dimensions, ses tiges plus grêles, et ses feuilles à bords plans ou très peu révolutés, et à tissu basilaire plus lâche, formé de cellules rectangulaires, lisses, pellucides, subhyalines.—Pl. I. figs. 1 à 11.

BRYACEÆ.

Bryum argenteum.

B. argenteum L., Sp. plant. p. 1120 (1753).

Mount Terror, Jan. 22, 1902; islet in old ice, MacMurdo Sound, Dec. 10, 1903; 'Discovery' W.Q., Dec. 15, 1903; Cape Royds, Jan. 11, 1904; ster.

L'aspect de ces échantillons prouve que cette espèce, qui jouit d'une dispersion

cosmopolite, se trouve ici dans des conditions très défavorables : les tiges n'atteignent que 2 à 3 millimètres de haut, et les plus grandes feuilles mesurent seulement 0·35 millim.

Bryum amblyolepis.

B. amblyolepis Card. in Rev. bryol. xxvii, p. 45 (1900), et Résult. Voyage 'Belgica,' Mousses, p. 37, pl. xi, fig. 1 à 11 (1901).

Granite Harbour, Jan. 20, 1902 ; ster.

Beaux et nombreux échantillons, formant des gazons étendus, veloutés. On trouve çà et là des feuilles qui se rapprochent beaucoup de celles du *B. argenteum*, mais l'aspect général de la plante reste différent, et la plupart des feuilles sont obtuses ou subapiculées.

Cette espèce n'était encore connue que du détroit de Gerlache.

Bryum antarcticum.

B. antarcticum Hook. fil. et Wils., Fl. antarct. II, p. 414 (1847).

Islet in old ice, MacMurdo Sound, Dec. 1903 ; ster.

Découverte par Hooker, à l'île Cockburn, cette espèce a été retrouvée aux îles Paulet et Seymour par M. C. Skottsberg, botaniste de l'expédition antarctique suédoise.

Bryum algens.

Cespites densissimi, valde cohærentes, intus fusco-rubelli, superne viridi-lutescentes, terra lutosa saepe obruti. Caulis erectus, ruber, parce radiculosus, nunc brevissimus, simplex, 3–10 millim. altus, nunc elongatus, usque 6 centim. longus, dichotome divisus, ramis erectis, plus minus clavatis. Folia nunc apice caulis et ramorum glomerata, nunc subæqualiter conferta, erecta vel patenti-erecta, inferiora minora, saepe valde remota, 1·6–2 millim. longa, 0·6–0·9 millim. lata, lanceolata, marginibus planis, superiora vel comalia majora, concava, polymorpha, late breviterque ovata, oblonga vel elongato-lanceolata, 1·7–3 millim. longa, 0·7–1 millim. lata, sat breviter vel longiuscule acuminata, marginibus integris, plus minus longe revolutis, interdum planis, costa basi pro more rubella, 100–150 μ crassa, in cuspidem lævem, viridem breviuscule vel longiuscule excurrente, cellulis inferioribus teneris, subrectangulis, hyalinis rubellisve, mediis et superioribus subrhomboidalibus, oblongis, chlorophyllosis, marginalibus angustioribus longioribusque, sed limbum distinctum non efformantibus. Inflorescentia monoica, forsan polyoica. Fructus desideratur.

Granite Harbour, Jan. 20, 1902, c. flor. ; islet in old ice, MacMurdo Sound, Dec. 1903 ; ster.

Cette espèce nouvelle ressemble beaucoup au *B. inconnexum* Card., du détroit de Gerlache, mais elle s'en distingue par ses gazons très cohérents et compacts, ses tiges plus grêles, ses feuilles de forme variable, ordinairement agglomérées en touffes au

sommet des tiges et des rameaux, à bords moins longuement et moins régulièrement révolutés, souvent presque plans.

Sur une section transversale, la nervure présente ordinairement un groupe de stenocystes en dessous de l'assise d'eurycystes ; mais les stéréïdes font défaut ; elles sont remplacées par des cellules plus petites que les éléments épidermiques, mais à lumen cependant assez large et à parois peu épaissies. Dans deux espèces du détroit de Gerlache, *B. inconnexum* Card. et *B. Gerlachei* Card., la nervure est également dépourvue de vraies stéréïdes, et ne présente que des substéréïdes, et il est très remarquable qu'une espèce arctique récemment décrite, le *B. languidum* Hag., de l'île Disco, sur la côte occidentale du Groenland, possède une nervure organisée exactement comme celle du *B. algens.** Il est probable que cette altération de la structure typique de la nervure dans le genre *Bryum* est due à l'influence du climat polaire.

Les échantillons de *B. algens* de Granite Harbour m'ont présenté trois sortes de fleurs : les unes mâles, contenant un grand nombre d'anthéridies, entremêlées de paraphyses très nombreuses, plus longues, hyalines, légèrement atténuées au sommet ; les autres femelles, renfermant des archégones plus ou moins parfaits, entourés de paraphyses plus courtes qu'eux ; enfin, des fleurs renfermant à la fois des anthéridies et d'autres organes mal développés, mais qui paraissent être des archégones imparfaits, plus ou moins atrophiés ; l'espèce serait donc polyoïque. Ce caractère la rapprocherait du *B. languidum* Hag., dont il vient d'être question, et auquel elle ressemble aussi par la forme et le tissu des feuilles, mais qui s'en distingue d'ailleurs par ses gazons lâches, peu cohérents, par ses feuilles distinctement marginées, et par sa nervure moins large (diam. 60–70 μ).—Pl. II.

EXPLICATION DES PLANCHES.

PLANCHE I.

Fig. 1 à 11. *Didymodon gelidus* Card.—1, plante, grandeur naturelle. 2, une tige × 3. 3, partie d'une section transversale de la tige × 360. 4, 5, 6, 7, feuilles × 35. 8, tissu de la partie basilaire d'une feuille × 360. 9, tissu de la partie moyenne d'une feuille × 360. 10, tissu du sommet d'une feuille × 360. 11, section transversale de la nervure × 360.

Fig. 12 à 17. *Ceratodon purpureus* Brid. *forma*.—12, 13, 14, 15, 16, 17, feuilles de formes diverses ×35.

PLANCHE II.

Bryum algens Card.—1, 2, plantes, grandeur naturelle. 3, sommet d'une tige × 3. 4, 5, 6, 7, feuilles inférieures des innovations × 17. 8, 9, 10, 11, 12, 13, 14, 15, feuilles moyennes et supérieures des innovations ×17. 16, 17, sommet de deux feuilles × 43. 18, tissu de la partie basilaire d'une feuille × 184. 19, tissu de la partie moyenne d'une feuille × 184. 20, tissu de la pointe d'une feuille × 184. 21, section transversale de la nervure ×360.

* Cfr. Hagen et Porsild, Meddel. om Groenl., XXVI. p. 463, pl. XV.

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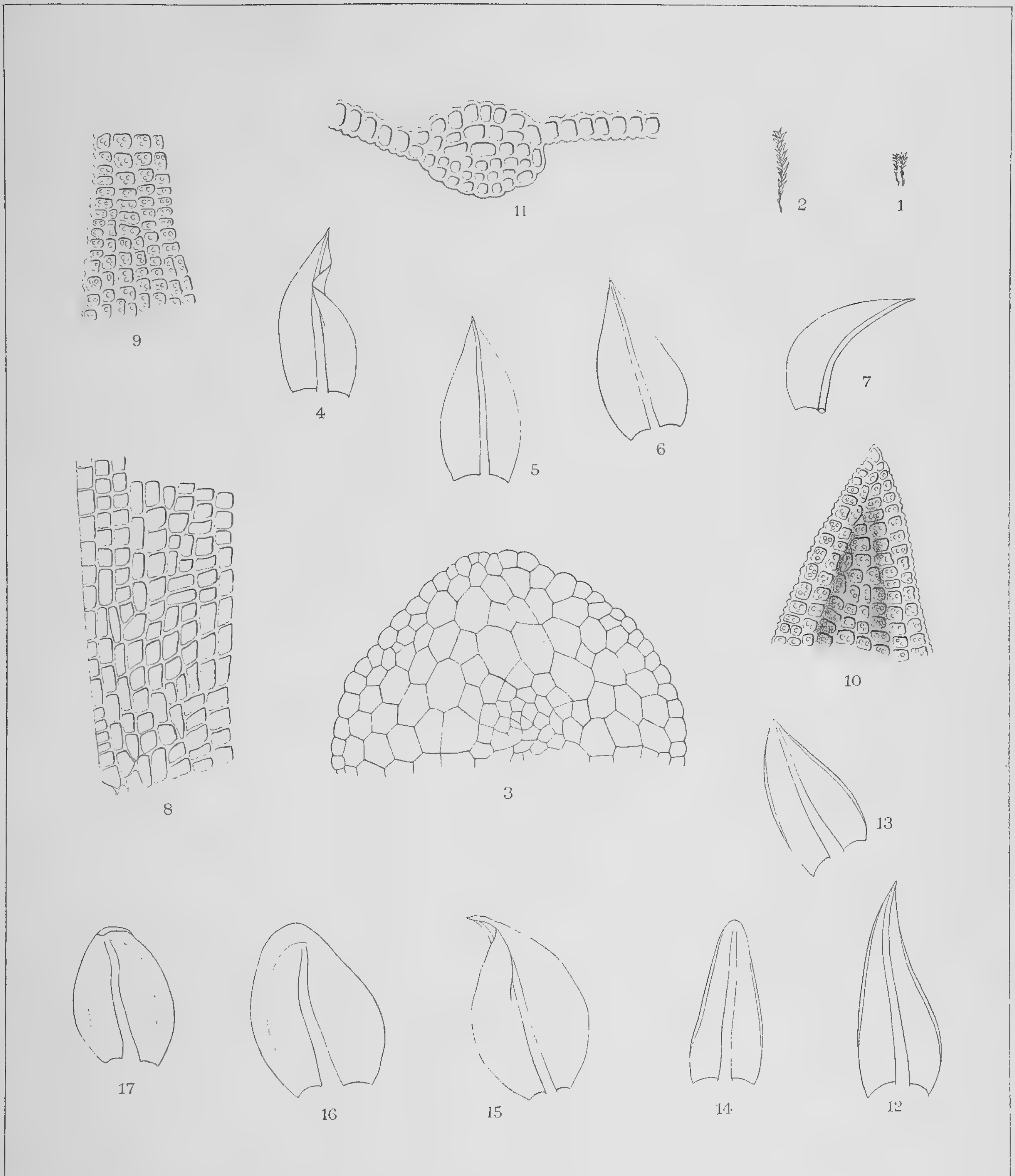
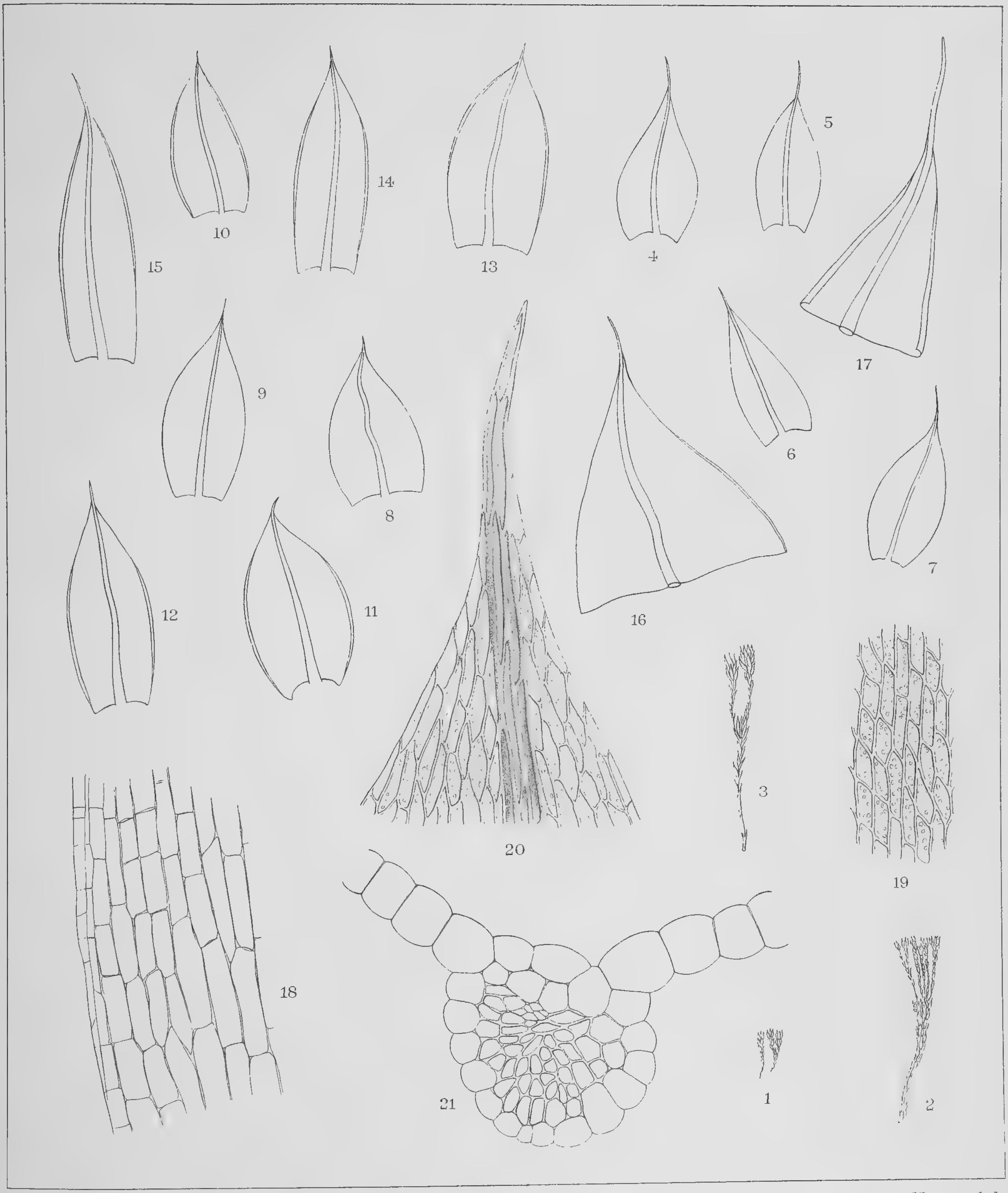


Antarctic (Discovery) Exp.

J. Cardot ad nat. del., West, Newman lith.

Fig. 1–11. Didymodon gelidus *Card.* Fig 12–17. Ceratodon purpureus *Brid.*



Antarctic (Discovery) Exp.

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Bryum algens *Card.*